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TRANSACTIONS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

HUNDREDTH ANNIVERSARY OF FIRST SHOW.

By JOHN STIRTON, Secretary to the Society.

THE Society's Show this year, which falls to be held at Dumfries, marks the hundredth anniversary of the Society's first General Show, which took place at Edinburgh in December 1822. Doubtless the occasion will evoke interest amongst members of the Society, and possibly of the public generally, as to the origin of these exhibitions, of which ninety have been held during the past hundred years, and which have played no unimportant part in the agricultural history of the country. To those desiring fuller information or details, ample material is available in the Society's 'Transactions' and other records, which have been most carefully compiled and preserved, and also in Mr Alexander Ramsay's comprehensive 'History of the Society,' published in 1879. The time, however, appears opportune for the present article, the scope of which is limited to a consideration of the origin of the Show, with a fairly full account of the first Show, and a brief view of subsequent developments.

EARLIER EFFORTS TOWARDS LIVE-STOCK IMPROVEMENT.

Although the first General Show was held in 1822, the institution of the Society dates to a period thirty-eight years earlier. The Society was instituted in February 1784, and incorporated by Royal Charter in May 1787, under the name of "The Highland Society of Scotland at Edinburgh." The

Centenary of the Society was celebrated at the Show in Edinburgh in 1884, when, to mark the occasion, the Society offered a sum of £4343 in prizes, this being nearly double the amount usually offered in those days.

In 1789, five years after its institution, the Society initiated a scheme for encouraging improvement in the breed of cattle, by offering premiums for district competitions. In that year the Society offered a seven-guinea gold medal for the best Highland Bull belonging to a proprietor or farmer in Argyllshire. *The competition took place at Connell, parish of Kilmore, on 20th October. The same year smaller prizes were offered for the best bulls in several outlying districts of that county.* It is interesting to note that, even at this early date, attention to breed type was strictly inculcated, the judges being directed to "pay particular attention to the shape of the bulls, and not to the size as it was meant to encourage the true breed of Highland cattle." In subsequent years these premiums were continued, and were gradually extended to other districts, until practically every county in Scotland came within their operation. In 1807 premiums for queys or heifers were added. At first the premiums appear to have been limited to Highland cattle, but this limitation did not long continue, and the premiums became open for competition to cattle of any breed in the district specified for the competition.

It is curious to note that from 1789 up till 1828 the Society announced these premiums as being offered for improving the breed of "Black Cattle." This description is apt to be misleading to the present-day reader. It, however, did not refer to colour, but was used merely to distinguish cattle from horses, the latter often being included under the term "Cattle."

In later years, when distinct breeds of cattle came to be recognised, the premiums were allocated with reference to particular breeds; and they have long been open to Short-horn, Ayrshire, Galloway, and Aberdeen-Angus, as well as to the Highland breed. Premiums for work-horses, stallions and mares, were added in 1816, sheep in 1820, and swine in 1827.

These local competitions have continued to form an important part of the Society's activity up to the present day. The system has, of course, undergone modification. At first the competitions were entirely controlled by the Society, the members in the particular district forming the Committee of Management, and either themselves acting as the judges or nominating these. In later years, with the formation of local societies in every district of the country, the system gradually obtained of giving the premiums, in the form of grants, to these local societies, which award them at their own local shows, under conditions laid down by the Society.

OTHER EARLY LIVE-STOCK COMPETITIONS.

The earliest live-stock competition in Scotland, so far as the writer is aware, took place in 1756, when the Edinburgh Society for the encouragement of Arts, Sciences, Manufactures, and Agriculture—one of the forerunners of the Highland Society—awarded a prize for the best draught stallion, and also a premium for the best fat calves. These competitions continued till 1764, the Society being wound up in 1765 after a short life of about ten years.

In the early years of the nineteenth century it would appear that several county or district associations in Scotland held shows of live stock. For example, the Garioch Farmers' Club in Aberdeenshire held a show of live stock in 1811, and annually for several years thereafter. The Morayshire Farmers' Club apparently had a show about the same time, although in its case a considerable period seems to have elapsed before another was held. Other societies, mainly in the north, probably followed the example of the two just mentioned.

In England the Bath and West Society, which was founded in 1777 as the Bath Society, and which is the oldest existing Agricultural Society in the United Kingdom, and several other county societies, doubtless held shows of some kind in the later years of the eighteenth century. The Bath and West Society, however, did not begin to conduct shows on any considerable scale until the middle of the nineteenth century, its interests prior to that date having been mainly concerned with the collection and publication of agricultural literature. The Smithfield Club's first show was held at Smithfield in 1799.

The Royal Agricultural Society of England, on the other hand, was not established until 1838, and its first show was held in 1839, at Oxford.

AGRICULTURAL CONDITIONS OF THE PERIOD.

The state of agriculture at the date of the first Show was one of acute depression, resembling in many respects the conditions prevailing at the present time. The years 1795 to 1814 were years of remarkable agricultural prosperity. This was the period of the wars of the French Revolution and the Napoleonic wars, terminating with the battle of Waterloo in 1815. The average price of wheat for the whole of that period was 89s. 7d. per quarter, and in 1812 was as high as 126s. 6d. The restoration of peace in Europe in 1815, and the re-enactment of the Corn Laws, marked the commencement of an era of severe depression and suffering for the

agricultural community. An immense fall in the price of all agricultural produce then took place, the conditions being aggravated by unfavourable weather and deficient harvests in 1816 and 1817, and still more by an Act passed in 1819 restoring cash payments. Coming into force in 1821, this Act caused serious embarrassment to all persons who had entered into engagements during the time of high prices and depreciated currency, which had to be met out of lower prices with a greatly enhanced currency.

An agricultural correspondent, writing to the 'Scots Magazine' from Perthshire in December 1822—a few days before the first Show—pathetically remarks: "The golden days of agricultural prosperity have come to a termination; habits of luxury or of splendour, on the part of the farmer, must now be dispensed with." He further mentions that in some of the winter markets cattle had experienced a brisk sale; horses brought very low prices; wheat of the best quality was about 20s., barley the same, and oats from 14s. to 15s., per boll.

In the Minute of the Anniversary General Meeting of the Society in January 1822, side by side with the resolution to hold the first Show, it appears that Sir John Sinclair called the attention of the Society to the distressed state of the agricultural interest, and the low price of all descriptions of farm produce, and moved that it be an instruction to the Directors to take into their early and most serious consideration the distressed state of the landed and farming interests, with authority to them to take such steps as the circumstances of the case might require with the view of providing effectual remedies for these distresses.

There is much more in the Minutes, and in the Press of the time, to the same effect, from which it will be seen that the idea of holding a General Show did not originate in a time of prosperity, but in a time of depression and considerable distress, comparable in many respects to the conditions through which agriculture is passing at the present day.

DECISION TO HOLD A GENERAL SHOW.

In January 1812, at the Anniversary General Meeting, a motion was approved referring to the Directors to consider the utility and plan of having an Annual Show of Cattle somewhere in the neighbourhood of Edinburgh, "as is the practice with other agricultural institutions in England and in Ireland." No further action, however, appears to have been taken on this motion at that time.

At a meeting of Directors, on 13th November 1821, Sir John Sinclair laid before the meeting a letter from Mr Rennie,

younger of Phantassie, soliciting the attention of the Society to the propriety of establishing an annual show at Edinburgh for the exhibition of Fat Stock on something of the same principle as that of the Smithfield Club. Mr Rennie recommended that, as many of the members of the Society were in town about Christmas, it might be expedient, should the suggestion be approved of, to fix the show about that season of the year, so that amateurs might have an opportunity of seeing the excellent stock likely to be produced. After hearing the opinions of several members, the Directors resolved that the suggestion was deserving of mature consideration, and they remitted it to a Committee for that purpose.

The Committee met on 1st December, and on 7th December 1821 reported to the Directors in favour of the proposal. In this report, after referring to the interest which the show was likely to create among agriculturists of all classes, and the emulation which it would excite among proprietors and tenants over the country, the Committee stated that it would be of public advantage to the city of Edinburgh by bringing to market, from the stock exhibited, a supply of the best meat at a season of the year when most required. They therefore thought it would be proper to make the experiment for one or more years, and recommended accordingly. They further suggested the classes to be provided and the premiums to be offered, and submitted the names of a Committee to which should be remitted the duty of carrying through the arrangements.

The report was adopted by the Directors, and at the Anniversary General Meeting on 8th January 1822 the proposals of the Directors were submitted and approved, a sum of seventy-five guineas being placed at the disposal of the Directors for the purpose of the Show in 1822.

The Committee in charge of the arrangements for the first Show consisted of Sir John Sinclair, Bart. ; Mr Robert Downie of Appin, M.P. ; Mr Robert Graham, advocate ; Mr William Macdonald of St Martin's ; Mr H. Macdonald Buchanan of Drumalkiln ; Mr James Hunter of Thurston ; Mr Andrew Murray of Murrayshall ; and Mr Joseph Gordon of Carroll. The three latter appear to have been unavoidably absent from the Show, and the Committee assumed in their places General Graham Stirling, Mr P. Small Keir, and Mr Adam Ferguson of Woodhill.

The first step was thus taken in what proved to be an important movement in the history of the Society, and it may therefore not be out of place to consider for a moment the objects and advantages which the Directors of that day hoped to attain from the "experiment" to which they had committed themselves. This may, to some extent, be gathered from the following passage taken from the report on the Show which appears in the sixth volume of the Society's Prize

Essays and Transactions, covering the period from November 1820 to December 1823 :—

“The advantages which had resulted from similar shows in England, by exciting attention to the merits and properties of the various breeds of cattle, and the high perfection to which skilful management had in consequence brought some of the finer breeds in that country, gave reason to expect success from the like means employed in Scotland. The excellence of some of our native breeds was well known, of which the hardy West Highland cattle afford an example. Much had been done, too, in this country already by several eminent breeders in improving the native breeds, and the stock reared by these individuals has in consequence attained a great degree of perfection. But most of our practical farmers are little conversant in this art, and are acquainted only with the merits of the breed peculiar to their own districts. If, therefore, they attempt a change or a cross, they generally do so injudiciously, and without the necessary knowledge and attention to the end in view, whether this were the attainment of a better form, earlier maturity, or habits and constitution more fitted to the local situation. It was concluded, therefore, that the opportunity which would be afforded of bringing the different breeds, and the best specimens of the same breed, together in contrast, by means of this General Show, would necessarily lead to more attention to the subject, and to a better acquaintance with the habits, the properties, and the peculiar characteristics of the various breeds reared in Scotland.”

THE PRIZE LIST AND REGULATIONS.

The Committee, guided by the assistance of practical farmers, divided the sum of seventy-five guineas into five classes of premiums, limited, in the first instance, to “Black Cattle,” and, with one exception (the Shorthorned breed), to the breeds peculiar to this part of the island, and for cattle reared and fed by proprietors and tenants in Scotland—first and second premiums of ten and five guineas being devoted to each class. The classes were as follows :—

1. The best pair of bullocks of the Shorthorn breed, not exceeding four years old.
2. The best pair of Aberdeenshire bullocks, not under three years old.
3. The best pair of West Highland bullocks, not under four years old.
4. The best pair of Angus, Fife, Galloway, or any other breed, not under three years old.
5. The ox showing the most symmetry, fat, and weight, of any age or breed.

The regulations governing the entry of stock for competition were not of an elaborate character. It may, however, be of interest to mention two of these. Cattle exhibited must not have been fed on oilcake. The distance each ox had to travel to the Show had to be stated on the entry form, as well as the date at which it was put to fatten, and what it was fed upon. Extra stock could be shown, these not to exceed two of each kind.

THE FIRST GENERAL SHOW.

The first General Show, the first open to competition from any part of Scotland, was held on Thursday, the 26th December 1822. The site selected was the open square at the back of Queensberry House, in the Canongate, which is now the House of Refuge. Queensberry House at that period was apparently a barracks, and the open space would be the barrack square or parade ground. Full acknowledgment is made in the Society's Minutes of the generous and ready manner in which the barrack authorities placed this site at the disposal of the Society, and also of the cordial manner in which Major Nairn, who was in charge of the establishment, and his subordinate officers, co-operated in the endeavour to make the Show a success. Members and the public were admitted by the gate in front of Queensberry House, facing the Canongate, and stock by the gate at the back opening on to what was long known as the South Back Canongate, but has recently been renamed Holyrood Road.

Queensberry House lies under the shadow of Arthur's Seat and the Salisbury Crags, in proximity to Holyrood Palace, and so within the confines of Edinburgh's "Historic Mile"—from the Castle to the Palace. Although situated in this densely-populated area of the old town, the open area behind the house, on which the Show was held, has remained practically unbuilt upon. New buildings do encroach upon it to a small extent, but the greater part of the area still remains open, being used as a garden and recreation ground. This will be seen from the accompanying illustration (Fig. 1). The total extent of the square at the date of the first Show must have been about an acre and a quarter.

The square was divided up, according to a plan approved of by the Committee, so that the competing stock were separated, according to their classes, in different compartments, distinguished by painted boards. These were placed on one side of the square, while a similar arrangement was made on the opposite side for the cattle which were exhibited as extra stock. These arrangements were carried out by Bailie Gordon of the Canongate, His Majesty's carpenter, who was

professionally employed on this duty. The greater part of the interior of the square was thus preserved for the accommodation of the public, so that "the cattle could be viewed by a very large company without inconvenience or annoyance."

A number of practical farmers and acknowledged judges of stock were invited to attend at half-past ten o'clock, and from these the Committee selected the judges best qualified to deal with the different classes. The animals then, as now, were marked by numbers, and the names of the exhibitors were withheld from the judges.



Fig 1. *Present day view of the area behind Queensberry House, where the first Show was held in 1822.*

Silisbury Crags are seen in the background

Members of the Society were admitted at twelve noon, and the public at one o'clock, on payment of one shilling each. The Show remained open till four o'clock on Thursday, the day of competition; and a further opportunity was given to the public of viewing the prize animals on the Friday from eleven to three o'clock. It was originally intended to keep the Show open for three days, but the weather having proved very favourable, the Committee decided that it was unnecessary to detain the prize cattle for more than one day after the day of competition, two days giving a sufficient opportunity to the public to view the animals. These had, of course, to be

withdrawn each evening, and accommodation for them found elsewhere overnight.

The Committee's report on the prize-winners in the various classes is a somewhat lengthy document, but as the occasion was unique and the report contains much which will doubtless prove of interest to stock-breeders of the present day, the greater part of it is reproduced below. The actual words of the report are retained as far as possible, some small omissions being made for the sake of brevity. The First Premium in each class was a piece of plate of the value of ten guineas, and the Second Premium five guineas.

CLASS I. Best pair of Shorthorn Bullocks (1 entry).—Mr John Rennie, yr. of Phantassie, produced a very magnificent pair of oxen, bred by Mr Robertson of Ladykirk; but as one of these had immediately to be withdrawn to compete in the fifth class, for the greatest symmetry, fat, and weight of any breed, Mr Rennie exhibited another pair certified to be 2 years and 6 months old, likewise bred by Mr Robertson of Ladykirk, and to which the First Premium was awarded. These fine cattle were fed on turnips, grass, and straw. They were put up to fatten about 1st May 1822.

CLASS II. Best pair of Aberdeenshire Bullocks (3 entries).—The First Premium was awarded to Mr John Rennie, yr. of Phantassie's two dark brown and yellow coloured oxen purchased from Mr M'Combie, cattle dealer, in September 1821, rising 5 years old, and fed upon distillery grains, bran, meal, and hay. They were put up to fatten upon extra keep about the 1st May last.

The Second Premium was awarded to Messrs Bogue & Walker 4 oxen, aged 4 years and 6 months. The *black* ox was bought quite lean and purchased out of a lot of forty from Mr George Williamson, cattle dealer, Aberdeenshire, at September Falkirk Market, 1821. It was put up to fatten about 20th September, and fed upon turnips and hay and had a little oats in the straw. He has been constantly in the house, having cut grass and tares in summer, the produce of the moorland farm of Snawdon belonging to the Marquis of Tweeddale. The *brindled* ox was bought from Mr M'Combie, was put up to fatten about the 10th November 1821, and as to feeding and other circumstances is entirely in the same situation with the black one.

CLASS III. Best pair of West Highland Bullocks (5 entries).—The First Premium was awarded to Mr Alexander Brodie of Coalston Mains for two black oxen, aged 4 years and 6 months, and fed on grass, turnips, bran, and beans. They were originally grazed by Mr Stirling of Keir, and first put up to fatten by Mr Brodie on the 1st October last.

The lot excited very great interest and was universally admired; and in a Note appended to their decision the judges "beg to express their opinion that this pair are two very superior cattle." The feeder states that they were in his possession since the 1st May, but until the 1st October they were no otherwise fed than his other cattle.

The Second Premium was awarded to Mr Home Drummond's two oxen, 5 years and 6 months old. They were bought out of a drove at the October Tryst of Falkirk, 1819. The following winter they lay out in a grass field and got no other feeding but a little straw when the ground was covered with snow. Next summer they were grazed upon good old grass, and in November 1820 were laid upon turnips and straw. They

were fed in the very same way in 1821, and up to the day of competition they never got any other feeding but turnips, straw, and grass, except for the last ten days, when they got an oat sheaf every day to prepare them for travelling.

There were very good specimens of this class of Stock exhibited by Sir John Buchan Hepburn, Sir William Forbes of Pitsligo, and Mr Dickson of Dunse.

CLASS IV. Best pair of Bullocks of the Angus, Fife, Galloway, or any other breed (3 entries).—The First Premium was awarded to Mr John Rennie, yr. of Phantassie, for two four-year-olds of the Fife breed, bought from Mr Bannerman, cattle dealer, at Falkirk in 1821—colour, a black and a dark brown. They were fed on distillery grains with a little hay, and were put up to fatten 10th October 1821.

The Second Premium was awarded to Mr James Russell of Meadowfield, for two brindled oxen (twins) of the Fife breed, aged 4 years and 7 months. They were bred in the neighbourhood of Inverkeithing, and were fed on turnips, grass, and pease-meal, and first put up to fatten 15th October 1821.

The other lot which was exhibited for these Premiums was of the Dunrobin breed, and was very much noticed. They were bred on the Marquis of Stafford's farm, produce of 1817. They were grazed in the field, and in winter fed upon straw, without turnips, till September 1819, when a moderate quantity of turnips was afterwards afforded to them. In November last they were brought into the yard from the grass field, and have since been fed upon turnips, potatoes, and about a lippie of oats per day. They are the property of Mr Stuart, yr. of Duncarn, and the judges of this class thought it proper at the end of their awards to remark "that one of this pair was superior to all the class shown," though the inferiority of his companion prevented them from awarding a premium to this lot as a pair.

CLASS V. The Ox showing the most symmetry, fat, and weight, of any age or breed (3 entries).—The First Premium was awarded to Mr John Rennie, yr of Phantassie's roan-coloured Shorthorn Ox, 3 years and 6 months old, bred by Mr Robertson of Ladykirk, and along with his companion of the same age, purchased from him last April. They were fed on turnips, hay, and bruised beans, and had no other description of corn; they have increased 30 stones in weight since Mr Rennie purchased them, and were supposed to weigh above 130 stones.

The Second Premium of this class was awarded to Mr William Gulland of Stripeside's Ox of the Fife breed, bred by Mr Balfour of Fernie; his age, 4 years and 7 months. He was put up (not in a very good condition) to feed about the 20th November 1821; fed that winter on turnip and straw, and on cut clover and a little hashed beans in summer 1822, and on hay, turnip, and hashed beans since 1st November last.

The other lot in this class, belonging to Mr James Dickson of Dunse, was less noticed only from being brought in competition with the extraordinary animals already mentioned. It was a Dun Ox of the Aberdeenshire breed, bought at Hallowfair in November 1820—at present 4 years and 7 months old, and fed on grass and turnips alone. He was of excellent stamp and very fat, and only inferior to the others in size and weight.

EXTRA STOCK.—Under the head of "*Shorthorn Cattle*," the Committee must particularly notice some of the most genuine of that breed, the property of Mr Stuart, yr. of Duncarn, being lineally descended without a cross from "*North Star*," the own brother of the celebrated "*Comet*,"

and the best selection from Mr Collins's stock of that day. Mr Stewart exhibited a two-year-old bull of this strain of blood, and a heifer, "Young Stella," which in symmetry should yield to none that were exhibited. He also produced a good specimen of a cross with a country cow, which evinces the value of the breed in giving early maturity, or the propensity to fatten.

Mr Rennie produced a lot of twenty-two bullocks, which would have done honour to a country when the introduction of this valuable breed was farther advanced, and a very large and well-shaped two-year-old bull (by Sirius), bred by Mr Robertson of Ladykirk.

Mr Dickson of Dunse exhibited three very fine animals of the *West Highland* breed, a blue or dun four-year-old heifer of a beautiful form and great points, and a very remarkable brindled heifer two and a half years old, with its mother, bought in calf at the September Falkirk Tryst of 1819. Mr Angus showed a very fine West Highland ox, five years old, fed by the Earl of Morton, as a good specimen of symmetry of that breed in a small-sized animal.

But of all the stock which was exhibited there was none more curious, more generally admired, nor greater beauties of their kind, than two Shetland heifers, "Minna" and "Brenda" by name, the property of Mr James Bell of Leith. These little animals were very fat, and made their appearance at the Show, as is supposed, in a very different condition from that in which they left their native shores. "Minna" had travelled 84 miles to the Show from Mr Bell's estate in Dumfriesshire, and joined her sister "Brenda," which had been fed by him nearer Edinburgh. The little animals were great favourites with all who beheld them.

It is recorded, as evidence of the quality of the stock shown, that Mr Rennie's first prize animal in Class V. sold for sixty guineas; and Mr Stuart's yearling extra stock heifer, a Shorthorn cross with a country cow, for twelve guineas, which was a remarkable price for that period. Indeed, it is stated, the greater part of the stock shown were sold on the spot at high prices.

Although no premiums were offered for sheep, Mr Dickson exhibited eight New Leicester two-year-old wethers; and the list of live stock is complete when it is mentioned that there were "two beautiful pigs" from Mr Gray's farm of Gorgie Mains, near Edinburgh.

The judges at this first General Show of live stock were: Class I.—Mr Wilson, Preston; Mr Gulland of Stripeside; and Mr Pattullo, Millfield. Class II.—Mr Thomson, Pusk; Mr Wilson, House of Hill; and Mr Andrew Walker, Letham. Class III.—Mr Rennie, younger of Phantassie; Mr Bogue, Woodhall; and Mr Aitken, Carneil. Class IV.—Mr Crawford, Pitbauchie; Mr Sands, Blaircessnock; and Mr Ord, Blairdrummond. Class V.—Mr Wilson, Preston; Mr Bogue; and Mr Ord.

The receipts at the gates for admitting members of the Society and the public to see the cattle amounted on the day of the Show to £48, 11s. 6d., and on the following day to £4, 0s. 6d., or a total of £52, 12s. This sum, although inconsiderable compared with the amounts drawn at the present

day, was found by the Committee to be sufficient to relieve the Society of all extra expenses for advertising, printing, fitting up the yard, and servants employed on the occasion.

This reference to the drawings naturally leads to the observation that one familiar feature of the Society's later Shows was not wanting on this the first occasion. A correspondent, who signed himself "A Highlander," writing to the 'Scotsman' after the Show, violently attacked the Committee of Management for enforcing the payment of one shilling for admission to the showyard, and ridiculed the suggestion that this arrangement was made to exclude the rabble. The Committee do not appear to have been unduly perturbed, and the criticism is effectively disposed of by a writer who signs himself "Sassenach" in an interesting communication regarding the Show, which appeared in the 'Farmers' Magazine' of February 1823.

In reading this account of the first Show one may experience a feeling of disappointment in finding that, even at that date, the holding of a show of live stock was not a novelty; and that the first Show, so far at least as the competition was concerned, was entirely confined to fat stock. With regard to the first point, it can, however, be claimed that it was the first Show, either in Scotland or in England, which was open to the whole country, and in that respect it was a new departure. With regard to the second point, the difficulties of transport, at a time when there were no railways, must be kept in view. The animals exhibited, many of which came long distances, must have travelled on foot, and must have spent days on the journey. This could more readily be undertaken when they were not under the necessity of being sent home again. They were destined for the fat-stock market, and would have to undertake the journey, or a similar journey, in any case. Breeding stock, however, were in a different position, and, unless sold, would require to perform the double journey. This was a matter not to be undertaken lightly; but even then we find that several breeding animals were shown in the extra-stock section. The Society has all along recognised the importance of encouraging the exhibition of animals for breeding purposes, but in those days it was doubtless felt that the extensive system of local competitions, already referred to, met that requirement. In any case it will be seen later that classes for breeding stock very soon found a place in the Society's annual general show; and with the introduction of railways, and consequently better transport facilities, these gradually came to occupy the first position, practically to the exclusion of all others.

SHOWS AT EDINBURGH IN 1823, 1824, AND 1825.

The success of the experiment of holding a first Show was such that it was decided to repeat it in 1823. The total prize-money on that occasion was a hundred guineas, this being sufficient to repeat the prizes of 1822 for cattle, and, in addition, to provide classes for pens of three fat wethers of the Blackface, Southdown, Cheviot, and improved Leicester breeds, as well as a class for the best three fat pigs of any breed. The Blackface wethers had to be not under four years, the Cheviot not under three, and the Southdown and Leicester not under two years old. The Show was again held at Queensberry House, and took place on Wednesday and Thursday, the 10th and 11th December. The drawings on this occasion amounted to £75, 1s. 6d. The chief honours again went to Mr John Rennie, younger of Phantassie, who secured the first prize in the class for Shorthorns, the first prize in the class open to any breed, and the first prize for pigs.

This Show saw the inauguration of the Agricultural Dinner, which came to be a prominent feature of many subsequent Shows, although in recent times it has fallen into abeyance. The dinner was held on the afternoon of the first day, a large party assembling in the Royal Exchange tavern. Sir John Sinclair occupied the chair. The following passage from his speech shows that he possessed a remarkable appreciation, for that time, of the manner in which these meetings would be found to exert their true benefit to agriculture. He said: "I have long wished to see meetings assembled in Scotland for promoting the improvement of our live stock, and I am happy to find that, under the auspices of the Highland Society of Scotland, they have commenced in this metropolis with so much probability of success. Such meetings are of great use in various respects: they are the means of circulating valuable information; they excite a spirit of improvement, and much advantage is derived from the discussions which they occasion, and from the opportunities which they afford of viewing the various descriptions of stock which a country possesses, and comparing their respective properties and defects. A Bakewell or a Culley, by great skill, ability, and perseverance, may do much in ameliorating any particular breed, but the improvement of the general stock of a nation can never take place without such meetings as the one which we have this day witnessed."

The Shows of 1824 and 1825 were also held in Edinburgh. In 1824 classes were added for store oxen of the Aberdeenshire, Galloway, Fife, and West Highland breeds, the animals to be ready to put up for feeding. A prize of ten sovereigns or a piece of plate was also offered for "the best two cows of

any breed for the purpose of breeding." This was the first offer by the Society, at their general shows, of a prize for cows as breeding stock. The competition was held on 8th December, but the attendance seems to have been somewhat less than the previous year, as the drawings were only £59, 11s. At this Show, for the first time, appeared some excellent agricultural implements, exhibited by Mr Morton, Leith Walk, and Mr Kirkwood, Tranent. Mr Barclay of Ury also exhibited a sample of his Georgian oats. The Show of 1825 was held on 7th December, and the attendance was greater, the drawings amounting to £80, 14s. Two new classes were added for heifers—one for two heifers of the Shorthorn breed, under two years old; and the other for two heifers of any other breed, not exceeding four years old. The exhibition included not only implements, but also a good collection of roots and seeds for agricultural purposes.

THE SHOW BECOMES ITINERANT.

The year 1826 saw the commencement of the movement which ended in the Shows visiting various districts of the country at regular intervals. That year the Show was held



Fig 2.—Sketch of a showyard in the early days.

On the right is the Ladies' Gallery, in front of which is the stage on which the prize animals were exhibited. The pavilion on the left contained exhibits of Dairy Produce, Wool, &c. Cattle and Horses were tied to the boundary fence, Sheep and Pigs occupied spaces at opposite ends of the Yard, while Implements were placed in the centre.

[Reproduced from the 'Aberdeen Constitutional,' 9/10/1840]

for the first time in Glasgow. It was a very successful Show, the drawings going up to a sum of £275. New classes were provided for Ayrshire bulls and Ayrshire cows and yearling heifers, and these were well filled. This was the first real

exhibition of breeding stock at these general shows, as the class for cows in 1824 brought forward no entries, and in 1825 the class for Shorthorn heifers secured no entries, and the class for heifers of any other breed brought out only two Galloways and two West Highlanders. Horses were also shown at Glasgow for the first time, there being a large entry of mares, but a disappointing entry of three-year-old colts and fillies.

In 1827 the Show was again back in Edinburgh, and in 1828 in Glasgow. This latter must have been a remarkably successful Show, from a financial point of view, as the drawings amounted to £400, a sum which was not equalled until the Show came back to Glasgow ten years later.

In 1829 the Show was held at Perth, and this marked the real commencement of the circuit of shows as we now know it. In 1830 it was held at Dumfries, in 1831 at Inverness, in 1832 at Kelso, in 1833 at Stirling, and in 1834 at Aberdeen. With the holding of these Shows it may be regarded that the principle of itinerating shows was fully established, and it has been pursued, with variations from time to time, up to the present day.

It is not possible in this article to enter into details of the long series of ninety Shows, or to trace the developments which took place from time to time. A full list of the shows will be found at the end, with statistical information relating to the numbers of entries, premiums, and gate money. It only remains to notice one or two points of a general nature

DEFINITION OF BREEDS OF CATTLE AND SHEEP.

In 1834 the Society set itself to determine what classes of cattle and sheep should be regarded as distinct breeds, and, as such, encouraged by having separate premiums provided for them at the annual Shows. An important Report on the subject was prepared by a Committee, and was adopted by the Society. The breeds which it was decided to recognise as distinct were—*Cattle*, the Shorthorn, West Highland, Angus, Galloway, and Ayrshire; *Sheep*, the new Leicester, Blackface, and Cheviot. These decisions were acted upon at the Show of 1836, and the breeds mentioned were recognised as the Society's regular cattle and sheep sections for many years thereafter. Indeed, it is only in comparatively recent years that classes for breeding stock of other breeds of cattle and sheep have been added.

The breeds which were formerly recognised and were now omitted were the Fifeshire and Horned Aberdeenshire cattle, and Southdown sheep. With regard to the Fifeshire breed, it appeared to the Committee that, though very fine animals

under this name were often reared by the care and skill of particular breeders, yet in its general character the breed of Fifeshire was inferior to what the district was capable of producing. With respect to the Horned Aberdeenshire, as the interests of the breeders of that district were evidently leading them to rear the hornless in preference, it was not for the Society to attempt, by the offer of premiums, to revive the cultivation of the other. Southdown sheep, although admirable as a breed in various districts of England, appeared to the Committee to be only partially adapted to the conditions of Scotland.

On the recommendation of the same Committee, it was also decided that from 1836 onward stock from England be admitted to competition at the annual Shows.

OTHER IMPORTANT DEVELOPMENTS.

Up till 1852 members of the Society paid for admission to the Show in the same way as members of the public. In that year a privilege was conferred by which all who applied for tickets before the commencement of the Show were admitted to it free. This naturally led, in course of time, to the present practice of furnishing all members with free tickets of admission to the Show.

In the 'Transactions' for 1859 appears an exhaustive report by a special Committee on the "whole system and machinery of the Society's General Shows." Many suggestions were put forward by this Committee, and most of them appear to have been adopted and acted upon. With regard to the period of the year for holding the Show, they suggested that between the 1st and 10th of August was the most suitable time. The reasons given for this recommendation were that it secured a long day, and afforded the most favourable chances of propitious weather. Parliament had then broken up, and strangers had an opportunity of attending on their way to the moors. The circuit of the Shows was also dealt with at length, it having apparently been urged that, with the advent of railways, it was no longer necessary to hold Shows at the various centres, and that they might with advantage be restricted to Edinburgh and Glasgow. The Committee strongly opposed any such change, while agreeing that extra meetings might be held, as opportunities offered, in these two cities.

This Committee also suggested that the stock should be on view for three days instead of two, and this led to the proposal that shedding be erected for their accommodation instead of their being withdrawn overnight. Up to this date members of the Society entered stock free of charge, and non-members paid an entry fee equivalent to $2\frac{1}{2}$ per cent of the premiums.

With the introduction of shedding it was suggested that members pay according to a scale of charges, ranging from 10s. for stallions to 5s. for sheep and swine, non-members being still charged in addition the $2\frac{1}{2}$ per cent of the premiums.

Many other matters, including the appointment of judges, provision of forage for stock, and premiums offered for implements and stock, were dealt with. In connection with the latter, it is interesting to note that it was recommended that the premiums for horses should continue to be offered for horses "for agricultural purposes," a classification which has persisted in the Prize List up to the present day.

NUMBER OF SHOWS HELD.

As already mentioned, ninety Shows have been held during the past hundred years. There were therefore ten years in which no show took place—viz., 1849, 1851, 1853, 1855, 1862, 1866, 1915, 1916, 1917, and 1918. In 1849, owing to general depression and other causes, it was decided that the shows be held triennially. The triennial system, however, never came into operation. The decision caused considerable dissatisfaction, and it was accordingly agreed to hold a show in 1850. For a few years thereafter the meetings were held biennially, but from 1855 they again became annual. In 1862 no show was held, the Society taking part, with the Royal Agricultural Society of England, in the international show at Battersea. The show of 1866 had, in common with all shows throughout the country, to be abandoned on account of the prevalence of cattle plague or rinderpest. The shows of 1915, 1916, 1917, and 1918 were abandoned on account of the war.

DATES OF THE GENERAL SHOWS.

During its earlier years, as has been seen, the Show was held in December. Very soon, however, the date was advanced to October or September; and for a long period of years now the Show has been held in July or early August. The general trend of dates is shown in the accompanying chart (Fig. 3), which gives, in graphic form, the dates of the Shows from 1840 up till the present year.

THE CIRCUIT OF SHOWS

The Society has, for Show purposes, divided the country into eight divisions, which are visited by the Show according to a regular circuit or rotation. These Divisions, together

CHART SHOWING DATES OF SHOWS

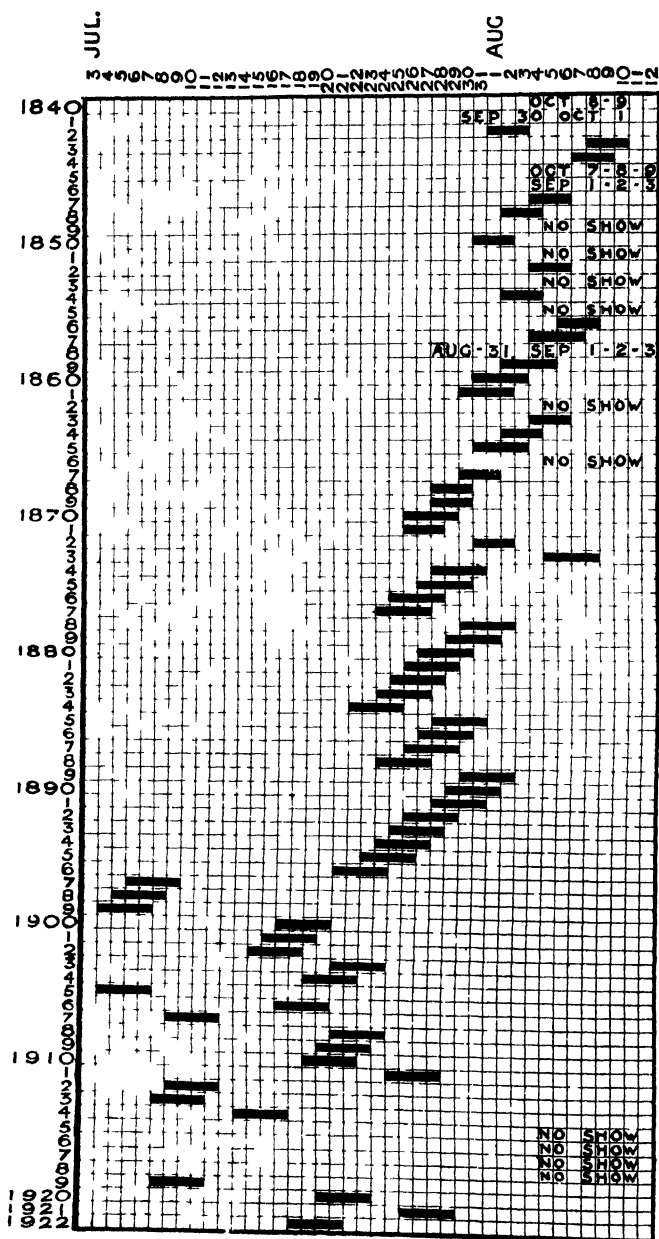


Fig. 3 — Dates of Shows from 1840 to 1922.

The years are given on the left. The days of the month will be found by reference to the top. Earlier Shows are not included, in order to keep the chart within reasonable dimensions

with the total number of Shows held within each, are as follows :—

	Shows held.
1. EDINBURGH—The counties of Mid-Lothian, East Lothian, and West Lothian	15
2. ABERDEEN—The counties of Aberdeen, Banff, Forfar (Eastern District), and Kincardine	11
3. STIRLING—The counties of Stirling, Dumbarton, Clackmannan, and western district of Perthshire	8
4. DUMFRIES—The counties of Dumfries, Kirkcudbright, and Wigtown	10
5. INVERNESS—The counties of Inverness, Moray, Nairn, Ross and Cromarty, Caithness, Sutherland, Orkney and Shetland	10
6. PERTH—The eastern district of Perthshire, the counties of Fife and Kinross, and western district of Forfar	12
7. GLASGOW—The counties of Lanark, Ayr, Renfrew, Argyll, and Bute	14
8. BORDER—The counties of Berwick, Roxburgh, Selkirk, and Peebles	10
	90

In the majority of these divisions the Show has invariably been held at one centre, but in others the Show has been held at different centres. The accompanying map (Fig. 4, p. 20) shows the divisions of the country and the centres visited, with the number of visits in each case.

The object of the Society in visiting these divisions in rotation is to furnish the rural population with occasional opportunities of seeing, within their own districts, breeds of stock not common to them, and of inspecting a full collection of the most improved implements of agriculture.

While the system of itinerating Shows may entail a certain loss of revenue in diminished drawings at the less populous centres, it is generally admitted that the advantages outweigh the disadvantages. The periodic visit of the Show to a district stimulates interest in the Society, which benefits by an accession of new members. In this way any loss in Show revenue is counterbalanced by an increased annual return from members' subscriptions.

MAP OF SCOTLAND, WITH SHOW DIVISIONS

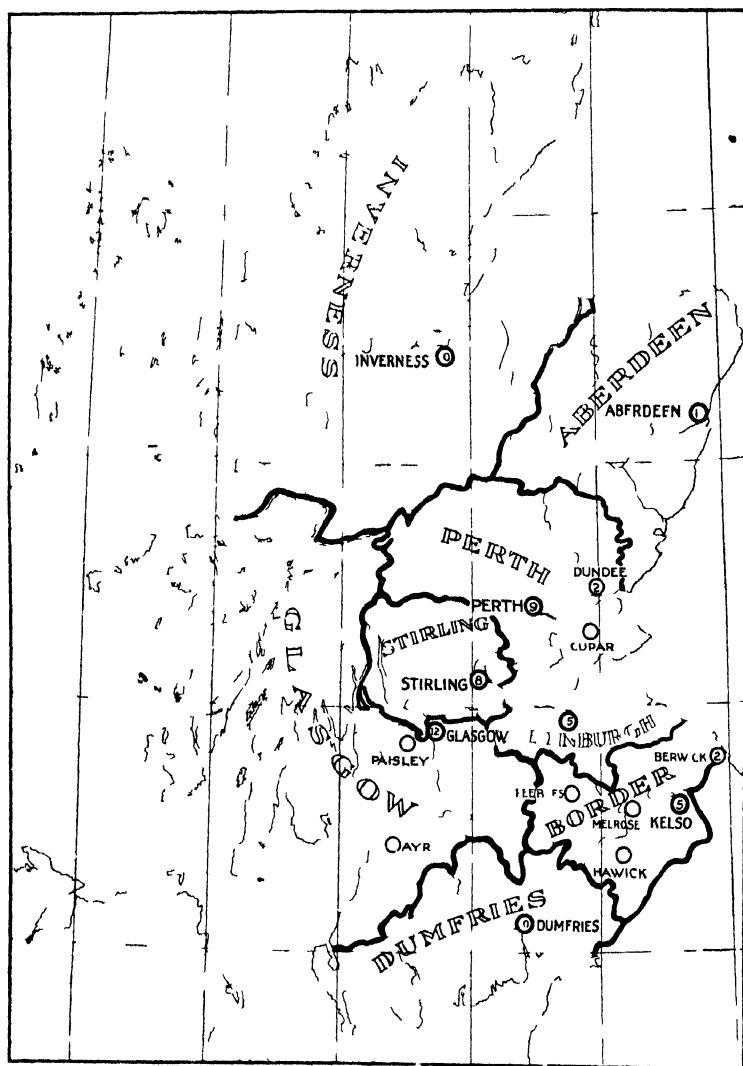


Fig 1 -Outline Map of Scotland with indication of the eight Show Divisions indicated by a heavy line;

The cities at which Shows have been held are indicated by a small circle with a number (1-8) inside, and the cities at which they have not been held are indicated by small circles and figures.

TABLE OF GENERAL SHOWS.

The following table shows the place, date, number of stock and implements, &c., premiums offered, and the receipts at each of the ninety shows held by the Society:—

Locality.	Date.	Cattle.	Horse.	Sheep.	Pigs.	Poultry.	Dairy Produce.	Wool.	Implements.	Premiums offered.	& Catalogues.
1. Edinburgh	1822	58	..	8	2	..	..	..	..	£78	£51
2. Edinburgh	1823	44	..	77	12	..	..	..	..	110	75
3. Edinburgh	1824	62	..	89	5	..	..	..	30	105	59
4. Edinburgh	1825	42	..	43	7	..	..	..	20	110	80
5. Glasgow	1826	226	49	148	24	..	..	..	50	186	275
6. Edinburgh	1827	44	..	138	6	..	..	..	50	224	83
7. Glasgow	1828	314	42	112	69	..	..	..	30	277	400
8. Perth	1829	192	53	199	13	..	..	..	14	357	119
9. Dumfries	1880	180	62	247	19	..	..	..	18	353	163
10. Inverness	1831	198	77	129	11	..	..	..	4	318	71
11. Kelso	1832	88	18	245	16	..	..	..	11	530	129
12. Stirling	1833	288	68	160	54	..	..	..	22	553	211
13. Aberdeen	1834	188	77	192	58	..	28	..	9	627	337
14. Ayr	1835	320	70	324	40	12	43	..	29	576	325
15. Perth	1836	265	46	416	18	..	6	..	17	479	225
16. Dumfries	1837	181	77	512	15	..	31	..	36	650	382
17. Glasgow	1838	461	121	274	47	..	39	..	62	781	849
18. Inverness	1839	302	93	445	43	..	..	..	24	744	211
19. Aberdeen	1840	269	80	126	69	..	46	..	50	781	586
20. Berwick	1841	175	96	658	33	..	..	..	60	1050	410
21. Edinburgh	1842	295	179	487	53	..	38	13	200	1200	1873
22. Dundee	1843	317	73	324	30	34	31	..	101	990	900
23. Glasgow	1844	558	210	565	64	50	277	..	357	1600	1 42
24. Dumfries	1845	297	75	537	62	101	88	..	143	900	440
25. Inverness	1846	428	112	357	33	76	23	..	59	1050	254
26. Aberdeen	1847	361	105	230	24	102	42	..	49	920	510
27. Edinburgh	1848	351	142	760	58	128	165	..	310	1153	1398
28. Glasgow	1850	484	164	639	85	172	316	..	577	1359	1909
29. Perth	1852	313	135	662	50	186	123	..	339	900	926
30. Berwick	1854	179	141	771	86	264	..	..	357	1500	805
31. Inverness	1856	248	131	469	43	156	..	..	231	1000	815
32. Glasgow	1857	415	240	669	112	429	234	..	610	1500	2415
33. Aberdeen	1858	450	189	590	79	366	..	..	302	1500	1229
34. Edinburgh	1859	332	188	583	80	327	54	..	980	1500	2343
35. Dumfries	1860	298	166	558	54	216	195	..	911	1500	1275
36. Perth	1861	335	155	616	77	360	91	..	850	1500	1928
37. Kelso	1863	245	127	532	49	261	..	..	1101	1300	1423
38. Stirling	1864	397	181	614	76	252	..	..	973	1350	1729
39. Inverness	1865	361	132	812	43	294	..	..	707	1300	920
40. Glasgow	1867	286	212	575	80	450	143	..	1344	1600	3005
41. Aberdeen	1868	373	139	632	57	480	..	..	1158	1600	1577
42. Edinburgh	1869	310	212	764	42	717	..	..	1900	1600	4078
43. Dumfries	1870	374	171	817	76	402	130	..	1873	1600	1897
44. Perth	1871	376	177	684	71	501	88	..	1948	1600	2270
45. Kelso	1872	274	214	595	56	291	..	..	1777	1885	2171
46. Stirling	1873	406	297	622	96	534	..	..	1400	1860	3140
47. Inverness	1874	391	175	477	48	451	..	..	1161	2080	1120
48. Glasgow	1875	411	405	623	58	665	152	..	2220	2665	6231
49. Aberdeen	1876	424	227	478	84	520	..	..	1812	2440	2899
50. Edinburgh	1877	339	342	596	38	802	..	..	2292	2714	6754
51. Dumfries	1878	357	328	621	39	303	235	..	2578	2703	3308
52. Perth	1879	383	253	470	56	200	49	11	2207	2629	3063
53. Kelso	1880	275	226	483	42	244	..	8	1678	2671	1664
54. Stirling	1881	336	215	393	39	365	..	..	2001	2340	2577
55. Glasgow	1882	376	331	490	51	310	122	..	2622	2818	3249
56. Inverness	1883	354	172	375	33	304	..	..	1280	1978	1295
57. Edinburgh	1884	580	453	1180	49	258	104	..	2282	4343	6548
58. Aberdeen	1885	385	223	423	11	252	40	..	1849	2368	3436
59. Dumfries	1886	287	312	505	32	144	146	..	1639	2588	2314
60. Perth	1887	..	239	530	38	210	72	..	1509	2372	1841
61. Glasgow	1888	300	308	517	38	209	110	..	1606	2464	2187
62. Melrose	1889	271	248	583	56	220	51	..	1288	2276	2214
63. Dundee	1890	310	232	410	45	271	90	..	1552	2158	2387
64. Stirling	1891	318	252	381	69	317	65	..	1563	2114	2930

Locality.	Date.	Cattle.	Horses.	Sheep.	Goats.	Pigs.	Poultry.	Dairy produce.	Bee-Api- phances, &c.	Wool.	Imple- ments.	Pre- miums offered.	Gate Money & Cata- logues.
65. Inverness	1892	255	218	366	..	9	229	29	..	..	1881	£2066	£1750
66. Edinburgh	1893	380	349	500	..	49	360	88	..	..	2268	2600	4918
67. Aberdeen	1894	314	324	314	..	52	365	58	..	..	2532	2440	5121
68. Dumfries	1895	269	353	416	..	..	245	114	..	..	2265	2456	2599
69. Perth	1896	292	258	362	..	30	374	45	..	..	1945	2205	4788
70. Glasgow	1897	317	350	424	..	46	275	126	..	118	2227	2897	4592
71. Kelso	1898	244	270	485	..	43	335	38	..	24	1933	2885	2192
72. Edinburgh	1899	386	518	658	..	72	551	44	..	14	2585	3845	10,231
73. Stirling	1900	321	288	469	..	50	457	66	..	24	2095	2895	4505
74. Inverness	1901	360	257	248	..	34	499	42	..	22	1463	2806	2476
75. Aberdeen	1902	330	253	294	..	66	454	48	..	16	1988	2796	4413
76. Dumfries	1903	279	282	332	..	55	423	128	..	33	1884	3073	2919
77. Perth	1904	348	315	356	..	55	418	46	..	..	1972	3058	4993
78. Glasgow	1905	310	462	321	..	104	541	79	..	..	1875	3702	4460
79. Peebles	1906	253	258	370	..	59	448	72	..	..	1658	3072	4085
80. Edinburgh	1907	363	464	416	..	87	616	93	..	..	2140	3613	7588
81. Aberdeen	1908	331	299	278	..	42	514	54	..	..	1931	3045	4596
82. Stirling	1909	330	355	281	..	54	553	49	..	..	1977	3017	4638
83. Dumfries	1910	270	355	324	..	54	493	110	..	..	1950	3057	3411
84. Inverness	1911	308	275	278	..	64	485	41	..	..	1513	2870	2550
85. Cupar-Fife	1912	294	348	285	..	81	560	58	..	..	1801	3310	3580
86. Paisley	1913	408	472	378	..	48	545	95	..	..	1968	5109	6460
87. Hawick	1914	264	357	519	..	35	427	33	..	93	1878	4142	4043
88. Edinburgh	1915	215	301	249	60	43	404	48	35	49	1605	4517	17,377
89. Aberdeen	1920	340	250	336	19	112	633	43	69	36	2065	4608	14,120
90. Stirling	1921	367	279	363	59	188	597	66	66	56	2201	5055	12,522

CONCLUSION.

The extent to which the Show has developed during the past hundred years will be readily gathered from the foregoing table of figures, and no words are required to emphasise this remarkable record of growth and expansion. Fluctuations in numbers of entries have occurred from time to time, these varying to some extent with the district in which the Show happened to be held; but, on the whole, progress, which was rapid in the earlier years, has been steadily maintained throughout the whole period.

On the occasion of the hundredth anniversary attention is naturally fixed on the first General Show in 1822, which was the starting-point of the whole series. If credit is to be given to any one person for that first venture, that credit undoubtedly belongs to Sir John Sinclair, Bart., whose influence led the Society to embark on the enterprise, and whose genius and foresight, as Chairman of the Committee of Management, had much to do with the success of the Show. Part of the credit must, however, be attributed to the enlightened action of the first Directors of the Society, who, in its earliest days, established the system of Local Competitions in the various districts of Scotland. These competitions fostered a spirit of improvement throughout the country, which reacted beneficially on the General Shows in later years as means of transport developed, so that the General Show as we know it to-day may be said to have had a dual origin—the District Competi-

tions throughout the country, and the General Show at one centre.

That the Shows have continued to grow and prosper during these hundred years must, however, be mainly attributed to the remarkable enthusiasm which the members of the Society and the agricultural community generally have always evinced towards these annual gatherings. That enthusiasm, it is not too much to believe, is largely founded on the feelings of attachment and affection which the people of Scotland have always entertained towards the National Agricultural Society.

THE CONSTRUCTION OF DAIRY BYRES.

By CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan.

TOGETHER WITH NOTES ON VARIOUS BYRES OF IMPROVED CONSTRUCTION, BY W. R. WATSON, F.I.S.A., ARCHITECT.

THE construction of Dairy Byres or Cow-houses is a subject whose importance is now very generally recognised; and the time appears to be ripe for its consideration. Among intelligent dairy farmers it has for years past attracted considerable attention; but the high cost of all building operations, during and since the period of the war, has made it premature to discuss the carrying out of schemes the expense of which might well appear to be for the time prohibitive. The prospect of reduced costs of labour and building material now goes far to remove this practical difficulty; and, at the same time, the fact that a certain number of improved structures have been erected enables the matter to be considered in a more definite and practical way than has until recently been possible.

Until lately, the treatment of the subject has been, of necessity, theoretical and conjectural, in the absence of numerous or varied attempts to deal with it in practice. Within the last few years, however, a considerable number of byres have been constructed, embodying, in various ways, an attempt to give effect to modern conceptions of dairy hygiene—to secure, on the one hand, the health of the cows, and, on the other hand, the cleanness of the conditions under which so essential and so sensitive an article of food as milk is to be produced. It is this fact which has both made it possible to enter on a practical discussion of the matter, and also determined the basis on which such a discussion should proceed. It is no longer necessary to indicate, merely as an ideal, the form which the housing of dairy cows should take. It has become possible to describe actual attempts to solve the problem in various ways. It is not, indeed, practicable to compare the success of the various methods that have been adopted. Sufficient time has not elapsed to render this advisable; and in any case comparison, in this respect, must always be difficult and hazardous, since different localities and conditions may easily demand different types of construction, and particularly since the proper

construction of buildings is only one factor in the case—methods of management and their strict observance being not less important than good architecture. On the other hand, the existence of buildings designed to give effect to modern ambitions and present-day knowledge places the whole discussion on a different plane from that on which it has heretofore been necessary to conduct it; and the plan of the present discussion is intended to take advantage of this fact. It has been thought advisable to proceed, therefore, by making a definite and in some degree comparative report on a certain number of typical attempts, some of older date and having a pioneer character, and others comparatively recent and embodying the lessons of the earlier attempts. It has been decided that this report should be made by a professional architect; and the Society has been fortunate in securing the services, for this work, of Mr W. R. Watson, architect, Glasgow, who has visited and examined the byres described in his report, which forms the second part of this article. That report speaks for itself; but it is also accompanied by plans of the byres described, with details of construction; and while these plans are, on various grounds, not published in the 'Transactions,' they are in the Society's library, and may be consulted there by members.

It seems to be desirable to follow, in the general lines of the discussion, the plan which Mr Watson has been asked to adopt in his report—to deal separately with the various problems that present themselves. But one or two general observations may usefully be made at this stage. In the first place, it cannot be too clearly kept in view that skill in design is of more importance than mere selection of materials. Many materials compete with each other on something like equal terms, some possessing one advantage and some another, and none being wholly exempt from criticism in respect it may be of cost, of endurance, or of adaptation to the comfort of the building; but while this is no doubt also in a less degree true of design, yet there are certain fundamental principles of byre construction which cannot be departed from without great increases of cost (bad design is always uneconomical) or real prejudice to the objects at which byre construction should aim.

With respect to material and design alike, it should never be forgotten that local circumstances play a large part in determining a wise selection—climate, exposure, relative cost of materials, relation to other buildings in a steading, all affecting, in one way or another, the utility or economy of any particular method of construction.

It may be well to bear in mind that the whole subject of byre construction is one more vital to Scottish and northern

the outer atmosphere is prevented by the presence of buildings or by any other cause, a box-ventilator is an effective substitute—a box having an opening at one end to the outer air, and running along the wall at the heads of the cows, with a hole in its floor at each cow-standing.

In the case of either construction, valves to control and restrict the inflow of air may be provided—in the case of supply through the wall, by means of metal discs suspended to a chain, rod or wire which raises or lowers them, and in the case of a box by a sliding plank which opens or closes the floor holes. It is not, however, really necessary to control the inlet directly, since it can be quite adequately regulated by limiting or increasing the outlet, because air will only be admitted in proportion as it is allowed to escape. Whichever method of providing an inlet be adopted, the inlet itself should, in my opinion, be placed high in the wall, sufficiently high to be above the reach of animals where no head passage exists, or, in the case of a head passage, to be above the level at which it might interfere with the use of the passage by attendants. Once the air has definitely been checked in its rush from outside, there is no limit to the height from which, in its natural course, it will flow to the floor.

The outlet in all modern byres—in all those described in the report—consists of the “Findlay” opening ridge, a glazed sash running along either side of the roof ridge, and opened or closed by a screw, lever, or other simple appliance. This construction, even when fully open, admits surprisingly little rain, except in the case of a direct and heavy fall of snow or rain without wind. In a byre with a centre passage the amount of rainfall is negligible; and in the case of a single row of cows in a byre it is easily dealt with by means of a metal gutter carried along below the opening. The warm and polluted air will naturally find its way to the top of the roof and be carried out, taking with it the carbonic-acid gas, whose excessive weight will not prevent it from following the impulse of the warm air with which it is mixed.

Such is the simple method of dealing with this vital problem.

DRAINAGE.

The drainage of the byre is a difficult as well as an important matter, which bears closely on the cleanliness of the cows and their milk, and also on the feet of the cows, which are apt to suffer from any defect in it if, as often happens, they stand back with their feet in the “grip” or wide gutter.

The chief difficulty arises from the fact that the dung which is deposited in the grip prevents the free flow of the urine, which therefore lies in pools behind the cows, and is

thus a considerable source of pollution, especially in the case of a long row of cows, involving a large accumulation of liquid towards the lower end of the byre. It will be seen that there are two methods of dealing with this difficulty. One, and probably the best, is to supplement the grip by a small deep gutter, either open or under a grating, to carry off the liquid. The outflow of the liquid may be directed, at the foot of the byre, in any direction which may be desired from time to time, and the manurially richer liquid of the urine kept separate from the thinner fluid of the byre washings.

But this method may not always be practicable. It may be prohibited by the nature of the ground or the situation or construction of the byre; and in this case resort must be had to underground drains, to which the liquid passes through grated openings at various points in the grip. The use of underground drains in farm-buildings has been strongly condemned; and it is no doubt most undesirable if such drains form part of a drainage system involving the risk of sewer gas. But in practice no evil results are to be feared from the use of a drain which is properly ventilated, and which empties itself, with such adequate flushing as must take place in a well-washed byre, through an open end into an open tank.

GENERAL CONSTRUCTION.

The general form and plan of the byre must often be determined by its relation to other buildings adjacent, which affect both the shape which it may take and the most convenient and economical arrangement for the provision of food and bedding, the removal of manure, and proper communication with the milk-receiving house.

Subject to these qualifications, there is much to be said for a long single-row byre, in which the fullest advantage can be taken of the use of food and manure-conveying arrangements, by which great economy in attendance may be obtained, and which should be provided when possible. In the case of large herds however, especially, double-row byres may be found more convenient and cheaper in construction. Where double-row byres are found better, two constructions are possible—one in which the cows stand tail to tail, and the other in which they stand head to head. Here again the choice may in some cases be determined in advance by the possibilities of access either to the outside or to buildings (food-stores, milk-house, &c.) which form an essential part of the byre organisation. When, however, there is an unfettered choice, there are very strong reasons for preferring the arrangement by which the cows stand tail to tail, with the cows' walk and cleaning passage running between them.

In the first place, this is the arrangement by which the air-supply can be most efficiently arranged without the risk of draughts. Direct air-supply is much more easily effected when the cows' heads face to the wall; and supply brought in by pipes to the centre is apt to be slow and uncertain. In the second place, except in the case of a herd completely and permanently free from tuberculosis, the risk of infection is much increased by the proximity of the cows' heads to each other, since the main carrier of infective tubercle is probably the sputum of the affected cow. There is certainly a greater degree of isolation in the case of animals standing with their tails to each other than in that of animals confronting each other.

Where cattle stand head to head in a byre a feeding or head passage is, as a matter of course, provided.

In other cases, whether of single or double row byres, the question of providing a head passage is one which requires consideration. There are, no doubt, circumstances in which it cannot be considered at all, in which the additional width of byre which it entails is rendered impossible by the restriction of space. When this difficulty does not exist the head passage has much to recommend it. It does, no doubt, require additional floor-space; but it need not entail any increase of the total cubic space of the byre; and space below the 10-feet level certainly possesses more air value than space above that level. It is not doubtful, further, that while many present-day byre-workers have not yet learned the economy of using a feeding passage, that economy will eventually be a very real one. There is all the difference in the world between supplying food—whether it be hay or turnips or short feeding—from a feeding-barrow to the heads of cows and conveying it to them individually from behind. It is no small advantage also, in inspecting the cleanness of feeding-troughs, to see them without passing up between every two cows in a row.

Apart, however, from its use in feeding, the head passage is a valuable factor in ventilation. Associated with such a ventilation system as has been described above, it forms a tank in front of the cows, constantly full of clean fresh air. From every point of view it is an advantage which few who have had experience of it would willingly be without. It has no doubt the disadvantage that it enables cows to stand forward, and thus to soil the stalls in which they afterwards lie; but this is an abuse not difficult to guard against by the use of bars, whether movable or fixed, which need not interfere with the use of the feeding passage. An additional advantage is that cows which, as sometimes happens shortly before calving, require to throw themselves forward in order to rise, can do this more safely when they are not closely

tied up against a wall. A head passage will more than repay its original cost.

The general dimensions of the different parts of byres which are well and economically constructed will be found to vary within comparatively narrow limits. The head passage should not be less than 3 feet in internal width; and it must be very substantially wider, at its corners at all events, unless the door from the food-house enters it directly, and in a straight line. The length of the standing will vary with the breed of cows to be kept. It will be noticed that in a well-designed byre reported on, for a Friesian herd, the standings are 8 feet long. In byres for Ayrshire cows they vary from 6 feet 8 inches to 7 feet 3 inches. Where there is a head passage the standing may be slightly shortened. The width of a double standing varies from 6 feet to 7 feet. The grip or gutter is usually from 21 inches to 24 inches wide, but in some instances is 30 inches wide. The tail passage for a single row is normally from 3 feet 6 inches to 3 feet 9 inches, and for a double-row byre from 5 feet 2 inches to 5 feet 6 inches. But the space given should probably be increased in both cases, particularly in that of the single-row byre, in which the width is sometimes found to be inconveniently small, both in difficult cases of calving and in safeguarding the milk against pollution.

With reference to the material to be employed, there is a strong case for the general use of concrete; and for the head passage and the grip nothing can be better. It is cheap, enduring, and easily cleaned. On the other hand, it is probably not the ideal material for the stall. The floor of the stall ought, above all, to possess two qualities. It should be impervious to moisture, and it should not be so conductive of heat as to be cold. The first condition precludes the use of ordinary brick, which is otherwise one of the kindest of floors. The second condition renders ordinary concrete unsuitable. There is no other flooring substance which is so cold; and not even the most abundant bedding can obviate this serious defect. No flooring can better fulfil the two most important conditions than vitreous "blue" brick, which forms an ideal stall flooring; but its cost is a serious drawback. It appears probable that experience may show "breeze" concrete to be the best material for this purpose, especially in view of its relative cheapness.

For the "walk" or cows' passage concrete has the serious drawback of being almost inevitably slippery. No surface treatment and no precautions seem completely to obviate this defect. Probably, if concrete is to be employed, no grooving or other treatment can do so much to render it safe as leaving it with a naturally rough surface. But no other material is so safe as 4-inch setts of whinstone or granite.

These form, no doubt, a costly floor; but the safety which they give appears to me to justify their original cost. Set in cement, they are a most enduring floor. With regard to the stall divisions, no material now largely employed can be an improvement upon reinforced concrete. On the other hand, there is an obvious advantage in the employment of open iron trevises, which admit of the washing of a whole row of stalls as a single unit, and thus promise a great economy of labour. I only hesitate to recommend them because I am not aware that experience of their use has been sufficient to test their suitability in other respects.

Two matters of detail require separate mention. The first is the position of the feeding-troughs. These should not be built close against the stall divisions or the wall in front—whether it be the dwarf wall of a head passage or the wall of the byre itself. If they are in this position it is inevitable that the cows' horns should be rubbed in feeding so as to become sharp to an extent both unsightly and dangerous. The troughs should be separated from the walls and divisions by a space of about 9 inches, which may be filled with brick, surmounted by concrete, sloping steeply against the wall or division to simplify the work of cleaning.

The other matter is the depth of the grip. A very common mistake has been to make this too shallow, in order to avoid compelling cows to step down to an inconvenient depth. This precaution, however, has been proved to be unnecessary. On the other hand, shallow grips offer a constant inducement to cows to lie back, so that their quarters and udders become polluted by the contents of the grip; and this entails either excessive labour in cleaning the animals or the certainty of polluting the milk. The grip should not be less than 8 or 9 inches in depth, and its floor should slope backwards, so as to discourage cows from standing back in it.

Another matter is perhaps almost too important to be described as a detail. It is the question of a constant supply of water in the stalls. This has been tried at various times, and has frequently been abandoned in consequence of the difficulty of keeping the water-pots reasonably clean. Much interest is taken in this matter at present, and various interesting attempts have been made to improve the arrangements for protecting the water against pollution. It can hardly be claimed that these attempts are yet definitely successful; but the difficulty can no doubt be overcome. The real question is whether the matter is of sufficient importance to justify the cost and trouble which it entails. It is urged by some of those who have adopted the system that it leads to an increase of milk yield; and this, if it were the case, would justify both cost and trouble. But it can hardly be said that the claim is yet definitely and conclusively

proved to be well founded. The question is one which ought to be carefully investigated on an adequate scale.

LIGHTING.

The matter of lighting is of no small importance. Where the glazed-roof ventilator is used it solves the problem of light, as well as that of air outlet. In its absence, it should be kept in view that the value of lighting depends partly on its being provided for at a high point, and preferably in the roof. In this situation 10 square feet of light should be provided for every 100 feet of floor space. At lower elevations a corresponding increase in lighting area should be provided.

REPORTS ON CERTAIN EXISTING DAIRY BYRES, AND A NOTE ON THE RELATIVE COSTS OF DIFFERENT FORMS OF CONSTRUCTION.

BY W. R. WATSON, F.I.S.A., ARCHITECT, GLASGOW.

The following notes, made after visiting each byre, were obtained by the courtesy of the various owners, who kindly afforded facilities which made it possible to prepare the plans and details of construction now available for consultation in the Society's library, and from which the tabulated statement has been composed.

Thanks are due also to architects who most obligingly lent their plans, and thus made it possible to dispense with laborious measurement. Reference is made to Mr Snodgrass, Beith, who designed Titwood Farm, Dunlop; to Mr Alexander Mair, Kilmarnock, for his plan of the byre at Crossburn Loans, Troon; and to Messrs Watson & Salmond for the drawings of the byre at Netherton, Newton-Mearns.

It only remains to say that the order of visitation was dictated by convenience, and the same order is retained in the following description of the byres.

TITWOOD, DUNLOP.

Ventilation.

The area of inlet works out at 13 square inches per cow. The fresh air is admitted to the feeding passage within a foot of the floor surface, the current being directed downwards. Findlay's continuous ridge ventilator is worked by screw gearing in four sections.

The maximum opportunity of outlet, if the width is assumed to be 24 inches, seems to be over 500 square inches per cow.

There is a door to the outside air at one end, and in the middle of one end.

Drainage.

Excrement and liquids received in an open channel having a fall in cross section to centre passage, and falling 12 inches or thereby in the length of the building; gradient about 1 in 100. At the last stall on each side of byre the channel is contracted across the width of end passage, and covered with a portable iron plate.

Some trouble had been experienced owing to choking at the point of contraction by solids carried down with the liquids, and the difficulty has been partly overcome by the construction of a sump and percolator.

Discharge to a 6-inch drain takes place outside the byre, the liquids being conveyed to a settling tank.

Lighting.

There are no windows. Roof-lights are provided in each bay over the feeding passage, and the Findlay continuous ridge ventilator is also glazed. The glass area per cow is approximately 5 square feet, and the result is adequate, the byre being well lighted in every part. About 10 square feet of glass is provided for every 100 square feet of floor area.

Construction.

The buildings have been designed with special regard to economy.

The steel roof-trusses are supported on piers, the panels consisting of 4½-inch brick walls built in Portland cement mortar, and strengthened every fourth or fifth course by lattice wire reinforcement laid in the joints. No construction could be more simple, and the continuous bond obtained by this inexpensive reinforcement results in a monolithic construction of great rigidity and strength.

The open roof is constructed of timber with heavy boarding covered with asbestos roofing-tiles. These tiles are economical and weight saving, being about one-fourth of the weight of ordinary Welsh slates, and making it possible to effect economies in the scantlings of the roof. Moreover, the property of non-conductivity of heat or cold is an advantage.

ROWALLAN HOME FARM.

Ventilation.

The area of inlet works out at 24 square inches per cow. The current, which is directed downwards, is admitted

through glazed fireclay inlets at a height of 5 feet from the standing floor, and directly over the cows' heads.

Findlay's continuous ridge ventilator is operated in one section by a lever arm. The maximum opportunity of outlet, if the width is assumed to be 24 inches, seems to be about 500 square inches per cow.

For through ventilation, in addition to the doors at each end, three panels containing regulating louvres controlled by a simple device are inserted in that end of the byre which abuts upon a covered yard giving access to boiler-house, scullery, &c.

Drainage.

Excrement and liquids received in an open channel, having a fall in cross section to a urine gutter covered by perforated plates next centre passage. The channel falls 4 inches or thereby in the length of the building; gradient about 1 in 100.

The channel and gutter discharge freely without contraction into a drain outside the byre, which conveys the liquids to a settling tank.

The urine gutter has a water-pipe at the head, and at the discharge end a by-pass prevents dilution of the liquid in the tank when flushing is taking place.

Lighting.

There are no windows. A range of roof-lights is provided in the north slope of the open roof, and the Findlay continuous ridge ventilator is also glazed. The glass area per cow is approximately 4 square feet, and the result is adequate, the byre being well lighted in every part.

More than 10 square feet of glass is provided for every 100 square feet of floor area.

Construction.

No special feature is noted in respect of materials used. The buildings are very substantially constructed of stone; the steel roof principals carry purlins covered with heavy boarding and slates. It was mentioned that the finish of floors, &c., had been rendered impervious by incorporating a waterproofing preparation with the Portland Cement.

CROSSBURN LOANS, TROON.

Ventilation.

The area of inlet works out at 7 square inches per cow. The air current, which is directed downwards, is admitted through glazed fireclay inlets contrived to baffle draught, and placed at 4 feet from the floor of the tail passage.

In addition, the upper half of alternate windows is constructed to open hopper fashion, directing the incoming air upwards, and when these are added, the area of inlet is increased to 18 square inches per cow.

Ridge ventilation is provided by means of Yuille's patent Turner ventilating roof-lights, each 52 inches by 16 inches, and placed alternately on one side or the other of each bay. These are, in effect, ordinary C. I. roof-lights hinged at the bottom instead of at the top, having a short bent lever arm operated by cords anchored to the head rails.

The only door leading directly to the open air is at the extreme end of one side of the byre.

Drainage.

Excrement and liquids received in an open channel, having a fall in cross section to an open urine gutter. The channel falls 9 inches, or thereby, in the length of the building, the gradient being about 1 in 100.

The channel stops at end passage, under which the liquids are conveyed in a covered 4 inch pipe to the gully trap outside, and from thence to the manure tank.

A small grating intercepts solids from the drain, and no trouble is experienced from choking.

Lighting.

There are nine side windows, seven on one side of the byre and two on the opposite side. The size of each window is 4 feet by 4 feet, and the sill is 5 feet from the floor. Steel casement sashes are used, and in alternate windows the upper half is constructed to open as a hopper sash.

Over the standing-places ranges of roof-lights are constructed in the slope of the roof. These are placed alternately on one side or the other of each bay. The ventilating roof-lights are also glazed. The glass area per cow is approximately 10 square feet, or, ignoring the side windows, 7 square feet.

Less than 10 square feet of glass is provided for every 100 square feet of floor area, but the lighting is quite adequate.

Construction.

This byre may be regarded as a steel frame building filled in with concrete slab panels.

Steel trusses, placed 9 feet apart, are supported on steel 8 inch by 4 inch stanchions, forming an independent and stable structure. The bays are filled in with breeze concrete slabs built as a hollow wall, which has no structural value other than as an enclosure. The steel stanchions are not exposed to view, being covered in, and protected from the

weather by the enclosure wall. The inner and outer shells are formed of $2\frac{1}{2}$ -inch breeze concrete slabs, united by iron ties across a 3-inch cavity. Fresh air is admitted to the cavity near the ground level. The sills of the windows, where these occur, are simply constructed of breeze concrete blocks laid on the flat across the cavity. On the outside face the slabs have received a skimming coat of cement, and the outside is rough-casted. The general effect is attractive, and the appearance is that of a more substantial building.

The wood purlins are dressed, and the flooring, which is laid with the dressed side downwards, is stained and varnished. The walls are distempered a light-cream colour, and the dado or lower wall round the whole interior is painted with a black bitumastic preparation.

SPRINGHILL, BAILLIESTON.

Ventilation.

The area of inlet is about 30 square inches per cow. The admission of fresh air is controlled by sliding boards, and the incoming current, which is admitted at 5 feet 6 inches or thereby from the floor of standing-place, is deflected downwards by different contrivances. The ridge ventilation consists of a range of Findlay's continuous ventilator, extending the whole length of the byre, and controlled by one lever arm. Arising in part from the fact that this byre is an addition to existing buildings, there are five doors of access or communication.

Drainage.

Excrement and liquids received in an open channel, having a very slight fall in cross section to the centre passage. The gradient to outlet is about 1 in 100. The channel discharges through the outer wall at a sharp inclination into a covered gully outside the building, and from there is conveyed to the manure pit. The discharge from the gutter to the pipe is not protected by any grating, and no trouble is found to arise from the absence of this precaution.

Lighting.

There are no side windows and no roof-lights apart from the glazed Findlay continuous, simultaneous acting, ridge ventilator, which is the sole source of light. The glass area per cow is less than 3 square feet, but more than 10 square feet of glass is reckoned to every 100 square feet of floor area.

Construction.

This byre has been modified in design by the adjacent buildings against which it is built, and in construction of the roof by the use of old materials found to be available and adapted to requirements.

A point of interest in the construction is the use of only one purlin, and that not in contact with the roof boarding. Mr Findlay is of opinion that the use of purlins disturbs the even flow of air which a smooth surface would promote. The type section on Mr Findlay's business circular shows what is in his opinion the best arrangement. It may be remarked here that if the use of common rafters is not the most economical as regards the use of material, the type of cross section (suitable up to 25 feet) drawn on the circular illustration shows how successfully Mr Findlay economises in other details of the roof.

The inner walls are cemented to a height of 5 feet; the surface is rough and not polished. The stall divisions are of concrete finished with a smooth surface.

NETHERTON, NEWTON-MEARNES.

Ventilation.

The area of inlet works out at 6 square inches per cow. The current is admitted direct without deflector or regulator through a $4\frac{1}{2}$ -inch diameter pipe placed 3 inches above floor of head passage. There are no gratings, and the arrangement is perfectly simple.

The outlet consists of a continuous range of Findlay's ridge ventilator, extending the whole length of the building, and controlled by gear placed on each gable to operate in two sections. The maximum opportunity of outlet seems to be over 500 square inches per cow stalled.

Drainage.

Excrement and liquids received in an open channel, having a fall in cross section to the centre passage. The channel falls with the rest of the floor 8 inches, or thereby, in the length of the building, the gradient being about 1 in 100.

The channel is continued to the end gable of byre, where it discharges through one of two alternative gratings. A portable shutter is provided to blank off the connection to manure tank when the flushing of the byre has greatly diluted the liquor. This arrangement is not in use, and as both gratings are always open, some alteration seems to have been made outside. No trouble arises from choking at the outlet.

Lighting.

There are six side windows in one wall. On the opposite side no windows have been placed, as the adjacent building is distant only 2 feet 6 inches from the wall. The size of each window is 4 feet by 2 feet 6 inches, and the sill is 5 feet 6 inches from the floor. The sashes are all fixed.

The remainder of the light is derived from the continuous Findlay glazed ridge ventilator. The glass area is approximately 4 square feet per cow, and more than 10 square feet of glass is provided for every 100 square feet of floor space.

Construction.

No novelty is found in the materials other than the use of 12 inch by 12 inch fireclay floor tiles in the standing places, and these seem to afford a non-slipping surface, with absence of chill. Some tiles softer than others seem to be wearing, and, after washing, the hollows so formed contain water which is soon absorbed.

The construction of the roof over the 29 feet 3 inch span is interesting in respect of the fact that the trusses are rendered stable by the use of upright steel stanchions, which serve to line off the head passage, and to steady the 4-inch concrete slab trevices which are bosomed into the stanchions where these occur, or steadied by glands and fixings to the single head-rail fixed between stanchions. The construction of the roof is further interesting on account of the underside of the purlins being brandered, lathed, and plastered to the apex ventilator.

The arrangement of the water-pots, one to each cow, divided by an admission compartment, leads to a projection into the head passage. This is further contracted by the strap iron grill, against which, in continuation of the concrete back slope of trough, sheet-iron plates have been fixed to prevent foodstuff being nosed into the passage.

HILLHOUSE, KILMARNOCK.*Ventilation.*

The area of inlet works out at 26 square inches per cow, and the maximum opportunity of outlet is about 500 square inches per cow.

The admission of fresh air is by means of apertures guarded by deflectors placed at 5 feet 6 inches from the floor of standing place, and in the centre of each stall for two cows. The admission of air is regulated on the Findlay system by loose flap valves resting on tongues actuated by a continuous rod operated by a lever working in a notched quadrant. The

walls are built hollow where other buildings abut against the sides of the byre, and this cavity is utilised as a continuous fresh-air duct, the admission of air to the duct being controlled by a pivoted feather valve. The extract of foul air is by means of a Findlay continuous ridge ventilator.

Drainage.

Excrement and liquids received in an open channel, having a fall in cross section to the centre passage.

The channel falls with the rest of the floor at a gradient of about 1 in 50. The levels of the ground outside had largely determined the fall, which otherwise would have been flattened to about 1 in 100.

The channel continues at its full width to the gable end, under which it is conveyed in a 4-inch diameter pipe guarded by a grating, and no trouble arises from choking at the outlet.

Lighting.

There are no side windows, and no roof-lights apart from the glazed Findlay continuous ridge ventilator, which is the sole source of light. The glass area per cow is about $2\frac{1}{2}$ square feet, and more than 10 square feet of glass is provided for every 100 square feet of floor space.

Construction.

No novelty is found in the materials used in construction, but the adaptation and use of a partial cavity wall as a fresh-air duct is interesting and suggestive. The absence of purlins to catch dust or to interfere with rising currents of fouled air is the chief interest of the roof, which, although not economical in the use of timber, appears light and open.

CARBETH, KILLEARN.

Ventilation.

The area of inlet works out at 42 square inches per cow. On one side the fresh air is admitted in an upward direction through agricultural tile pipes set in the wall at an angle of about 25° with the horizontal, and placed 5 feet 6 inches from the floor. There is no deflector on the apertures, but the volume of air is controlled by shutters connected with a rod sliding in grooved runners.

On the opposite side, owing to a barn abutting against the building for its whole length, the fresh air is admitted by lunettes placed in the roof, and controlled by flap valves operated by cords.

The outlet consists of a continuous aperture on both sides of the roof, formed by fixing tapered pieces on the back of the common rafters, and the area of outlet appears to be under 50 square inches per cow. There are doors at each end of both feeding passages, and also at both ends of the middle passage.

Drainage.

Excrement and liquids received in an open channel, having a fall in cross section to the middle passage. There is no gutter, and the channel discharges freely to one or other of two receptacles placed immediately outside the wall. By a simple gate-valve operated by hand the crude urine can be diverted into one tank, or the diluted urine and flushing water can be diverted into the other tank. The crude urine is conveyed to a liquid manure tank, and the flushing water is run to waste.

Lighting.

There are no windows. Two small roof-lights over doors from middle passage contribute but little to the light, which may be said to be solely derived from four ranges of roof-lights, giving approximately 3 square feet of glass area per cow, and more than 10 square feet of glass for every 100 square feet of floor area.

Construction.

This is an interesting example of the adaptation of an old building to the purposes of a byre. The problems solved here are such as might apply to very many similar cases where existing buildings have to be improved or adapted, subject to all the limitations which are imposed by congestion of buildings, unsuitability of level, design, or construction. Nothing ambitious has been attempted, and the aim has been to provide such accommodation as might best promote the health of the cattle and ensure the economical working of the byre without expenditure on superfluous details. Water-pots had been installed, but were taken out. The design and arrangement of the byre makes possible the use of conveyor carriers for manure and feeding-stuffs running on overhead track. This is an interesting and successful departure from old-fashioned methods.

KILMARONOCK MAINS.

Ventilation.

The area of inlet works out at 44 square inches per cow. The current, which is directed downwards, is admitted at a

height of 6 feet 3 inches from the floor, and the volume of fresh air can be regulated by shutters actuated by a continuous rod, and operated by lever arms. The system of inlet and of outlet are both on the lines recommended by Mr Findlay of Baillieston, the extract consisting of a continuous ridge ventilator, glazed and worked by gearing in four sections. The maximum opportunity of outlet seems to be over 500 square inches per cow.

There are doors at each end of the byre middle passage, but not at the ends of the feeding passages.

Drainage.

Excrement and liquids received in an open channel constructed of smooth adamantine blue bricks, having a fall in cross section to an adamantine blue brick gutter next middle walk. There is a fall in the length of the byre of 1 in 100, which is sharply increased just before the channel passes at its full width through an iron shoot built into the wall, and guarded by a hinged iron flap perforated along its lower edge for the passage of liquid discharges. The excrement is conveyed away in barrows, which are placed in position under these shoots. The liquor runs to waste.

At the high end of both channels a water-pipe is placed.

Lighting.

In addition to seven windows placed high in the wall on each side of the building, the continuous ridge ventilator is glazed. The glass area per cow is approximately 4 square feet per cow, and more than 10 square feet of glass is provided for every 100 square feet of floor area. The byre is very amply lighted, and the use everywhere of white enamel paint adds to the effect.

Construction.

Perhaps the most notable point of construction is the lavish use of costly adamantine blue, smooth, and chequered Staffordshire bricks for paving. A point of interest is the construction of the trevise with $4\frac{1}{2}$ -inch brick, built in Portland cement mortar, cemented on face, and finished with Keene's cement, which has been painted with white enamel paint.

The roof is plastered on the underside to form one continuous surface with the walls, and is broken only by the seven roof principals. These are of light design for the considerable span of 42 feet, and the outer surface of the roof is covered with sheathing felt, probably for the sake of lightness.

In every detail attention to lightness and cleanliness have been studied without regard to cost of material, and the result is a byre possessing many expensive refinements.

AUCHLOCHAN, LESMAHAGOW.

Ventilation.

Hillside Large Byre.—The area of inlet for each cow works out at 9 square inches per cow. The fresh air is admitted by means of Barr's adjustable air inlet valves, over which light sheet-iron baffles are placed to deflect the incoming air downwards. The valve inlets are placed about 8 feet from the floor. Findlay's continuous ridge ventilator is worked in one section by a slotted vertical arm. The maximum opportunity of outlet appears to be over 800 square inches per cow. At one end five cows are supplied with fresh air from a ventilating trunk, the apertures in which are regulated by a sliding board.

There are two doors to the open air in one of the long sides, and doors to the turnip house and boiler house respectively are close together in one corner.

Hillside Small Byre.—The area of inlet for each cow works out at 25 square inches per cow. Ordinary 6-inch diameter light cast-iron pipe bends are built in the wall, so as to deflect the incoming current of air downwards. On the outside of the wall the inlets are funnel-shaped. There is no means of regulation. The mouth of the pipe is placed 6 feet 4 inches from the floor. Findlay's continuous ridge ventilator, which is worked in one section by a slotted inclined rod, appears to give a maximum opportunity of outlet exceeding 650 square inches per cow. The byre is divided by a brick wall in the middle of its length, and from each half there is a door of exit to the open air.

Auchlochan Byre.—The area of inlet for each cow works out at 12 square inches per cow. The fresh air is admitted by means of Barr's adjustable air inlet valves, over which light sheet iron baffles are placed to direct the incoming air downwards. The valve inlets are placed 6 feet 6 inches from the floor. Findlay's continuous ridge ventilator affords a maximum opportunity of outlet exceeding 1000 square inches per cow. In addition to doors at each end of the feeding passage and tail passage, there is a door to the open air in the middle of the length of the building.

Drainage.

Hillside Large Byre.—Being an old building adapted to modern ideas of construction, standing places are placed

across each end, as well as on the long axis of the building. The levels had been unfavourable for a uniformly graded floor, and the difficulties have been overcome in the best way possible. Excrement and liquids are received in open channels, having a fall in cross section. The channels are graded to fall to outlets within the building, and these are placed at points to simplify the inevitable line of drain under the floor. The drain is trapped off from the collecting tank, where the liquor is conserved, and from which it is drawn.

Hillside Small Byre and Auchlochan Byre.—The same description of drainage arrangement applies to both. Drains are concealed under the floor, but after so many years, if the byres were to be constructed again, the channels would be graded to fall to a drain placed outside the building, and trapped off from any communication with it.

Lighting.

The three byres are lighted by the continuous glazed ridge ventilator. At Hillside large byre the ridge lighting is supplemented by three roof-lights placed over the feeding passage, and at Auchlochan byre two windows are provided in the side wall.

At Hillside small byre the ridge ventilator is shortened, owing to both ends of the roof being hipped, and the effect on the lighting is perceptible. At both the other byres the area of glass per cow is well over 4 square feet, and about 10 square feet of glass is provided for every 100 square feet of floor area, but these allowances are reduced at the small byre. Ridge lighting is most effective, general, and agreeable; even when of necessity curtailed, the diffusion of light is decidedly in advance of that obtained in any other way.

Construction.

Not being recent buildings, and one at least having been an adapted and improved building, there are no novelties in the use of materials. It is to be noted, however, that the whin cube setts used in preference to any other material for paving passages were adopted on account of their non-slipping qualities.

AULDTON, LESMAHAGOW.

Ventilation.

The area of inlet for each cow works out at 13 square inches. Ordinary 6 inch diameter fireclay pipe bends are placed in the wall, so as to deflect the incoming current of air downwards. On the outside of the wall the inlets are

closed by C. I. gratings of sufficient size. There is no means of regulation. The mouth of the bend is placed 5 feet 2 inches from floor of standing, and cattle were observed to be inhaling and apparently enjoying the incoming air. Findlay's continuous ridge ventilator is worked by a lever arm in one section. The maximum opportunity of outlet appears to be slightly over 500 square inches per cow. In addition, six roof-lights are fitted to open with Leggot quadrants.

There is a door at each end of the byre, and one door in the corner leading to turnip and hay shed.

Drainage.

Excrement and liquids received in an open channel, having a slight fall in cross section to the centre passage.

The channel is graded to fall to outlets within the building, and these are placed at one end and about the middle of the length of each channel. This arrangement involves a concealed drain within the byre, and no objection has been found, but a preference is expressed for the grid form of outlet grating instead of the perforated kind which choke very easily.

The liquids run to gully traps placed outside of the byre, and thence to waste.

Lighting.

In addition to the continuous glazed ridge ventilator, there are six opening roof-lights on opposite slopes of the roof. The glass area per cow is under 4 square feet, and rather less than 10 square feet of glass is provided for every 100 square feet of floor area, but even on a dull day the lighting seemed to be adequate. To make the apex of the ridge the principal source of light, as well as the only means of outlet, is sound practice both from a theoretical and from a practical point of view.

Construction.

The byre was designed by Mr Findlay of Springhill, Bailieston, and whilst presenting no novelty in the kind of material used, it follows closely on the type recommended and adopted by Mr Findlay, and is immediately recognisable in general design and matters of detail as one of the number of byres designed by him throughout the country.

	DIMENSIONS.					
	Number of Cows.	Length.	Breadth.	Height to Wall-head.	Cubic feet per Cow up to 10 feet.	Head Passage (if any).
Mrs HOUSON CRAUFURD, Titwood Farm, Dunlop, Ayrshire	54	103' 0"	31' 0"	10' 0"	590	3' 6"
Hon. GODFREY CORBETT, Rowallan Home Farm, Ayrshire	20	35' 9"	25' 6"	10' 0"	450	Nil
W. STEVENSON, Esq., Crossburn Loans, Troon, Ayrshire	40	82' 9"	36' 0"	10' 0"	745	Double 7' 1"
JOHN FINDLAY, Esq., Springhill, Baillieston, Lanarkshire	31	62' 6"	23' 6"	9' 8"	432	Nil
ANDREW CLEMENT, Esq., Netherton, Newton-Mearns, Renfrewshire	40	71' 3"	29' 2"	8' 0"	516	3' 0"
JAMES HOWIE, Esq., Hillhouse, Kilmar-nock, Ayrshire	40	69' 6"	24' 0"	10' 0"	426	Nil
Sir DAVID WILSON, Baronet, Carbeth, Stirlingshire	50	90' 0"	30' 0"	10' 0"	540	3' 6"
R. MARSHALL, Esq., Mains of Kilmar-nock, Stirlingshire	60	109' 8"	42' 0"	10' 0"	767	3' 6"
C. DOUGLAS, Esq., C.B., D.Sc., Auchlochan, Lanarkshire, Hillside Large Byre	25	74' 3"	22' 0"	10' 1"	653	4' 8"
Do. Hillside Small Byre	12	44' 8"	17' 5"	9' 1"	650	3' 4"
Do. Auchlochan Byre	16	56' 0"	15' 6"	11' 6"	542	3' 0"
GAVIN HAMILTON, Esq., Auldtoun, Lesma-hagow, Lanarkshire	27	49' 0"	25' 0"	10' 6"	453	Nil

IN THE CONSTRUCTION OF TWELVE BYRES WEST OF SCOTLAND.

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OTHER PARTICULARS.				STANDING.		GUTTER.		TAIL PASSAGE.	
Thickness of Wall at Head.	In the absence of a Wall describe arrangement at Head.	Whether supplied with Water-pots, and, if so, of what kind.	Trough, External Measure.	Length of Standing.	Width of Standing.	Width of Gutter.	Depth of Gutter (at edge of standing).	Single or Double.	Width of Tail Passage.
Nil	4" background to trough, two $1\frac{1}{2}$ " tubes	$14\frac{1}{2}$ " x $12\frac{1}{2}$ " glazed earthenware placed in centre of standing	19"	7' 2"	6' 4"	21"	7"	D	5' 6"
1' 7"	...	11" x 11" corner pots galvanised iron, fitted with scour and reflux valve	20"	7' 2"	6' 2"	30"	4"	D	6' 0"
Nil	$2\frac{1}{2}$ " concrete slab background to trough. Three 2" tube rails	Quadrant corner pots, heavy sheet welded and galvanised, fitted with scour and reflux valve	20"	8' 1"	7' 3"	30"	6"	S	3' 9"
1' 2"	...	None	$16\frac{1}{2}$ "	7' 3"	6' 8"	22"	7"	D	5' 8"
Nil	Sloped concrete background, one 2" tube-rail to which is fixed a continuous grill	$2' 6"$ x $13\frac{1}{2}$ " glazed earthenware water-pot placed in middle of standing with 2 compartments	24"	7' 0"	6' 6"	21"	8"	D	5' 2"
On one side 14" cavity wall (cavity used as fresh air inlet), on opposite side 22" stone wall	...	11" x 11" corner pots galvanised iron, fitted with scour and plug	19"	7' 4"	6' 0"	24"	7"	D	5' 4"
Nil	$4\frac{1}{2}$ " brick background cement plastered, fixed wooden rail and hinged wooden guard	Water-pots once installed, now removed	18"	7' 6"	6' 6"	24"	$5\frac{1}{2}$ "	D	4' 4"
Nil	Concrete slope surmounted by swing guard hinged from fixed grill and hay rack	$24"$ x $18"$ white enamelled trough in middle of standing common to two cows	$34\frac{1}{2}"$	9' 6"	6' 6"	24"	$3\frac{1}{2}"$	D	10' 0"
Nil	Concrete background $4\frac{1}{2}"$ thick, fixed wooden head-rail	None	$16\frac{1}{2}"$	6' 10"	6' 10"	24"	$3\frac{1}{2}"$	S	8' 5"
Nil	4" concrete background 1' 6" above trough	None	16"	6' 8"	6' 10"	24"	6"	S	5' 5"
Nil	4" concrete background	None	$16\frac{1}{2}"$	7' $1\frac{1}{2}"$	7' 0"	22"	5"	S	3' 5"
1' 10"	...	None	28"	7' 10"	7' 0"	22"	6"	D	5' 6"

MATERIALS.			
	Materials of Walls.	Materials of Roof.	Materials, Floor of Head Passage (if any).
4½"	Lugton bricks built in Portland cement mortar, reinforced every fifth course with wire lattice strips	Composite timber roof trusses, purlins, heavy boarding covered with asbestos tiles	Granolithic (rolled) on concrete
1' 10"	stone, Keenes cement and plaster on inside	Steel roof trusses, purlins, heavy boarding covered with slates	Nil
	Inner and outer walls of concrete breeze slabs 2½" thick, enclosing a three-inch air space or cavity, rough cast exterior, cemented inside	Steel roof trusses, purlins, heavy boarding covered with slates	Granolithic (rolled) on concrete
14"	brick, Portland cement and plaster on inside	Timber roof trusses (second-hand material had to be adapted), one purlin on each slope with common rafters and boarding	Nil
9"	brick, rough cast outside, Portland cement and plaster on inside	Steel roof trusses resting on outer walls and receiving support from stanchions placed at intervals in line of head of standing, underside plastered to ridge	Granolithic (rolled) on concrete
14"	brick, two 4½" walls with 4½" cavity used as fresh air inlet, upper part built solid	Findlay type, 9"×3" rafters, 36" to centres with iron hangers and ties at 72" centres, heavy boarding covered with slates	Nil
1' 10"	stone, Portland cement and plaster on inside	King-post timber roof trusses with purlins and light boarding slated (adaptation of an existing barn to byre purposes)	Cement on concrete
14"	brick Keenes cement and plaster on inside	Steel roof truss, light purlins, plastered on under side, sheathing felt outside	Staffordshire blue checkered paving bricks
1' 10"	stone, Portland cement and plaster on inside	Common rafter roof with king rod and tie every 4' 6" apart, light boarding and slates	Granolithic on concrete
9"	brick, Portland cement and plaster on inside, rough cast outside	Collar-beam trusses with purlins supporting boarding and slates	Granolithic on concrete
9"	brick, Portland cement and plaster on inside, rough cast outside	Collar-beam trusses with purlins supporting boarding and slates	Granolithic on concrete
1' 10"	stone plastered on inside	Findlay type 9"×3" rafters, 36" to centres, with iron hanger and tie every second rafter, boarding and slates	Cement on concrete

MATERIALS.			
Materials, Floor of Standing.	Materials, Floor of Tail Passage.	Material of Gutter.	Material of Trevises.
Fireclay bricks, 9" x 3", set on edge, concrete curb 1' 6" wide, checkered	Concrete finished with granolithic checkered 4" diamond pattern	Concrete (with grated urine channel)	4" brick on edge, reinforced with lattice in horizontal joints, cement rendered both sides
Granolithic (rolled) on concrete, waterproofed	Granolithic (rolled) on concrete, waterproofed	Granolithic (rolled) on concrete, waterproofed	4" concrete slabs
1½" thick finish, one part of ⅓' breeze and one part of cement, curb 12" wide, checkered	Granolithic (bold checkered) on concrete	Concrete with open urine channel	2½" reinforced concrete slabs accurately holed and slotted for fittings
Granolithic (rolled) on concrete	Concrete of whinstone road metal aggregate, cement and sand matrix	Concrete	4½" plain concrete slabs cast <i>in situ</i>
12" x 12" fireclay tiles, curb 6" wide, plain	Granolithic channeling (found slippery) has been roughened	Concrete (rounding of corners very well defined)	1" plain concrete slabs
Plain cement, standing border of granolithic, rolled, forming curb 1' 10" wide	Concrete plain cement finish	Concrete	4" plain concrete slabs
Cement on concrete	Concrete plain cement finish	Concrete	4½" plain concrete slabs
Staffordshire blue checkered and blue smooth paving bricks	Staffordshire blue checkered paving bricks	Staffordshire blue smooth brick and urine (open) channel, same material	6" divisions brick plastered with Keenes cement and enamelled
12" x 6" Staffordshire blue checkered paving bricks	1" x 4" whinstone cube setts grouted with P.C. mortar	Granolithic, checkered on concrete	4½" x 4½" posts and 6½" x 1½" cleading
12" x 6" Staffordshire blue checkered paving bricks	4" x 4" whinstone cube setts grouted with P.C. mortar	Granolithic drawn in 4" squares on concrete	4" concrete slabs
12" x 6" and 9" x 4½" Staffordshire blue checkered paving bricks	4" x 4" whinstone cube setts as before	Granolithic on concrete	4" x 4" posts and 4" x 1½" P.I. cleading
9" x 4½" fireclay bricks, concrete curb 10" wide	Concrete plain cement finish	Concrete plain cement finish	Cast-iron trevises

NOTE ON COSTS OF CONSTRUCTION.

The prospect of a further reduction in building costs makes it possible to contemplate the carrying out of schemes which have been held in abeyance by the prohibitive conditions prevailing during the war, and until quite recently.

It would be of interest to add some general remarks on the vitally important matter of cost. Even before 1914 prices for closely similar buildings varied greatly as a result of different local conditions, the presence or absence of competition, good or bad facilities for transport by road and rail, and the supply of labour. Now when trade is becoming stabilised and there is a general desire for work, the prices of materials are still fluctuating at high levels, and, even if it were possible to arrive at a probable average in any particular locality, the result could not be regarded as generally applicable.

At all times and in every case the cost of transforming ordinary farm buildings into cow-byres, or of improving or enlarging old and unsuitable byres, can only be determined by separate consideration of each proposal, for no two cases are alike. In the foregoing notes instances will be found of such adaptations and improvements to old buildings, and these are of special interest on account of the skill and ingenuity required to modernise buildings not specially designed in the first instance, but no comparison of cost is possible.

It may be said, however, that to adapt or to extend an existing unsuitable building may be more expensive, because less efficient and satisfactory, than to build an entirely new byre. Economical design, with a full appreciation of the possibilities of modern methods of construction, will give better results.

In constructing a new byre, unless in exceptional cases, the most economical arrangement is that of two rows, tail to tail, with a centre passage but no head passages. The cost per cow in such a byre is less than that of a single-row plan.

Where head passages are allowed the extra expense entailed by the increase of width is not compensated for by the slight gain from the decreased height of wall, as compared with a building having no head passages, but the advantages more than justify the increased capital expenditure. Moreover that increase of expenditure may be saved in other directions by paying strict attention to essentials, and declining ideas which have little merit but novelty.

The more simple and direct the plan and arrangement, the closer the attention to details affecting the comfort and cleanliness of the cattle, and the saving of labour to the workers, the greater will be the gain.

No advantage in cost seems to be gained by providing the required cubic space by increasing span or width at the expense of height of walls. The converse holds good only within definite limits, because undue contraction in width results in passages too narrow for clean and convenient working, and increase of height of side walls beyond 10 feet cannot be regarded as economical.

In the foregoing report will be found indications of the manner in which close attention to matters of detail and the adoption of economical methods of construction may facilitate the provision of new or improved accommodation incorporating tested ways of securing dairy hygiene according to modern conceptions.

THE VITAMIN HYPOTHESIS AND ITS PRACTICAL SIGNIFICANCE IN STOCK-FEEDING.

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By the middle of last century, as a result of laborious chemical investigations, the complex mixture of materials present in living tissues had come to be regarded as separable into the following groups: (1) Proteins (albuminoids), (2) Fats and Oils, (3) Carbohydrates (starch and sugars), (4) Mineral Matter. It was recognised, of course, that these groups were ill-defined, each containing substances merely allied and related rather than of identical chemical composition. It was also recognised that in the groups there were included substances whose nutritive value and chemical composition were unknown.

Although information with regard to the composition of foodstuffs was thus limited, it was assumed that the only important constituents were proteins, carbohydrates, fats, and mineral salts. It was believed that proteins and salts supplied the constructive material required for growth and repair, and proteins, carbohydrates, and fats the combustible material for the supply of body-heat and energy, and that nothing further was needed to maintain the animal body in health. As a result of this accepted belief it became customary to estimate the value of foods in accordance with the percentages of these nutritives present.

This assumption, that there were only four constituents of the food essential for life, was not based on experimental evidence. It had never been shown that an animal could be maintained on a diet consisting exclusively of these. The first definite statement that, for the maintenance of health, food must contain something more than these four recognised constituents was made in 1881, when it was shown that while mice could live on milk, they died if fed on a mixture of proteins, fats, carbohydrates, and salts, which had been regarded as the only important constituents of milk. It was concluded, therefore, that other substances besides these were necessary to sustain life. The importance of these unknown substances, however, was not fully appreciated

until 1912, when Hopkins of Cambridge¹ published the results of experiments which he had conducted with rats. These experiments showed that young rats on a diet of pure protein, sugar, lard, and salts, ceased to grow, and ultimately died, although the amounts of these constituents given were sufficient to yield the energy and the constructive material that was known to be necessary for growth and health. The addition of a small quantity of milk (about a fifteenth part of an ounce per day) to this mixture of substances that failed to sustain life ensured normal growth and health. The quantity of milk added made only an insignificant contribution to the energy-yielding value of the food, or to the known materials necessary for tissue formation already present. It was obvious, therefore, that the milk contained some hitherto unrecognised factors necessary for growth and health, and that very small quantities of these unknown essentials could exercise an enormous influence in nutrition. From the results of further investigations, it is now believed that there are at least three of these factors, as shown by their different distributions amongst natural foodstuffs, and by the different symptoms of the diseases that arise when one or other is absent from the diet.

To the whole group of these unknown substances the synonymous terms "accessory food factors" or "vitamines" have been applied. On account of certain objections to these names, the word vitamin (no final e) has been suggested as a group designation, the different members of the group being distinguished by letters. In accordance with this suggestion, which has been widely adopted in recent literature, these unknown factors or substances are referred to here as vitamins A, B, and C.

Most of the research work on vitamins has been carried out on small animals, such as rats, guinea-pigs, and pigeons. The results obtained in feeding experiments with these animals, however, as will be shown later, are not necessarily applicable to animals of other species. On account of this varied degree of susceptibility of different species to deficiencies of vitamins, considerable confusion has been caused by the unwarranted application to man and to farm animals of results obtained on small animals in laboratories. In the present article, to avoid this confusion, the nature of vitamins and the important rôle they play in nutrition will be first discussed with reference to the animals upon which most of the experimental work has been done. Thereafter, the practical significance of the vitamin theory to animal husbandry will be discussed in the light of the few experiments which have been done on farm animals.

¹ Jour. Physiology, vol. xliv., p. 425.

THE ROLE OF VITAMINS IN NUTRITION.

The three known vitamins are :—

- (1) Vitamin A, or Fat Soluble A, or Anti-rachitic Vitamin.
- (2) Vitamin B, or Water Soluble B, or Anti-neuritic Vitamin.
- (3) Vitamin C, or Water Soluble C, or Anti-scorbutic Vitamin.

It should be clearly understood that these three vitamins are merely hypothetical substances which have not been isolated or identified. Belief in their existence depends merely upon the fact that in some animals, on diets of purified food-stuffs, there occur definite symptoms of disease which, however, do not occur when the diet is supplemented by certain substances which, on account of their property of preventing or curing the disease, are assumed to possess vitamins. Our knowledge of the nature and function of the vitamins therefore depends upon the physiological effects produced in their *absence*, and the amount of any of the vitamins present in a food is measured by the influence of the food in preventing the onset of the symptoms associated with the absence of the vitamin.

VITAMIN A.

The Effect of Lack of Vitamin A.—This has been studied chiefly on growing rats. A diet deficient in Vitamin A, but otherwise adequate, results in cessation of growth, loss of weight, and ultimately death. Associated with the failure to grow is a marked increase of susceptibility to infectious diseases, which manifests itself especially in an inflammatory condition of the eye. It has been suggested that rickets, a disease in which there is defective bone formation, is caused by a deficiency of this vitamin, but of this there is no definite proof.

The body appears to be able to store Vitamin A, so that after a period of feeding on a diet rich in this substance, the animal can subsist for a variable length of time without showing signs of malnutrition, although no further amount is supplied. Full-grown animals seem to be able to live for several months on a diet deficient in this vitamin, but sooner or later there appears an inflammatory condition of the eye, together with a general lowered resistance to infectious diseases, especially those affecting the lungs.

Distribution and Properties.—This vitamin is very widely distributed. It is particularly abundant in animal fats, with the exception of lard. Cod-liver oil is especially rich in it.

In plants it is abundant in the green leaves. Roots and tubers contain much less. Grains are relatively deficient, although yellow maize contains considerable amounts. The Vitamin A that is present in grains is concentrated chiefly in the germ or embryo. Vegetable oils are poor in this substance, some such as olive oil containing practically none, and others such as linsced oil only small amounts. In most fruits it is present only in traces.

Only small quantities of Vitamin A are required to maintain health. The daily addition to the diet of 1 to 2 grammes¹ of clover or alfalfa or cabbage leaf is sufficient for the growing rat. It has recently been shown that 2 grammes of bran, which is not considered rich in Vitamin A, contains enough of this substance to maintain the rat in health. Even smaller quantities of butter-fat or cod-liver oil are sufficient.

Vitamin A is not readily destroyed by heat, but destruction takes place on prolonged exposure to temperatures of over 100° C. (212° F.) in the presence of oxygen. Heating or drying, as in cooking food or in curing hay, does not lead to any serious loss.

VITAMIN B.

The Effect of Lack of Vitamin B.—The results of deficiency of this vitamin were first noted in human beings. The natives in the East are accustomed to live largely on rice. With the introduction of milling machinery, the germ and outer coating of the rice were more thoroughly removed than had been the case with the native hand-mill. This machine-milled rice is known as polished rice, on account of the fact that after removal of the husk it is polished between sheep-skins. When polished rice forms the bulk of the diet of man, a disease—beri-beri—sometimes develops. A disease of the same nature develops very readily in birds fed exclusively on polished rice, and it is on pigeons and fowls that most of the experimental work has been done. It has been found that the disease is due to deficiency of what has been named Vitamin B, which is removed with the germ in the process of milling. It has been named the anti-neuritic vitamin, on account of the nerve symptoms that develop in its absence.

The characteristic symptom that appears in the pigeon due to a deficiency of Vitamin B, as occurs on a diet of polished rice, is paralysis of the legs and wings, which comes on in thirty or forty days. This is followed by death in a few days. Prior to the onset of this symptom there is loss of appetite and impairment of the processes of digestion, and in the young, cessation of growth. As the body carries no reserve

¹ 1 ounce = 28 grammes (approx.)

of this substance, cessation of growth usually occurs even more promptly in its absence than in the absence of Vitamin A. Atrophy of the generative organs and sterility have also been noted to develop on diets deficient in this vitamin.

A remarkable feature of the paralysis occurring in birds due to lack of Vitamin B is the extraordinary rapidity of the cure on administration of a substance rich in it. Within a few hours after receiving a concentrated dose, a bird that has been unable to stand will completely recover the use of its legs and wings.

Distribution and Properties.—This vitamin is present in milk and eggs and in animal tissues, though meat (muscle tissue) contains but little. It is present in relative abundance in all parts of plants, leaves, seeds, tubers, and roots. In seeds the vitamin is concentrated chiefly in the embryo or germ, and may be removed in milling, in which case, of course, it is present in the offal. It is present in abundance in yeast.

A rough indication of the relative concentration of Vitamin B in some of the substances which have been tested is shown by the amount of each that must be added to a pigeon's daily ration of polished rice to prevent the onset of the characteristic nervous disorders. The following amounts are stated in grammes: Wheat 1·5, Rice Bran 2·5, Egg Yolk 3·0, Lentils 3·0, Barley 4·0, Meat (muscle) 20·0. For rats, 1 gramme of alfalfa or clover or a rather larger amount of timothy hay is sufficient to ensure health and growth.

Heating does not appreciably diminish the amount of Vitamin B in a foodstuff, provided the temperature does not rise above 100° C. (212° F.), nor does drying. Old potatoes are as potent as fresh, and eggs seem to lose none of this vitamin in commercial drying.

VITAMIN C.

The Effect of Lack of Vitamin C.—In the absence of this vitamin scurvy develops. Scurvy has been known from the earliest times as a disease affecting human beings deprived of fresh fruits and vegetables. It used to be common among sailors on long voyages in the days of the sailing ship.

Most of the experimental work on scurvy has been done on young guinea-pigs. When these are fed on a diet consisting only of grains, with the addition of a little milk in which Vitamin C has been destroyed by heating, the following symptoms of disease appear in about a fortnight or three weeks. The appetite fails, and increase in weight, due to growth, gives place to a fall in weight. The joints get swollen and tender, and the animal becomes reluctant to move. Death occurs in about four or five weeks. Post-mortem examination of the body usually shows hæmorrhages, chiefly

into the muscles of the legs, the joints, and the intestinal tract. The gums are soft and the teeth loose. The bones are thin, and fractures are common.

Distribution and Properties.—The anti-scorbutic vitamin, which prevents the onset of these symptoms, is present only in small amounts in animal products. Meat (muscle flesh), even if fresh, if it is the sole source of anti-scorbutic, requires to be eaten in large quantities to prevent scurvy. Liver and blood contain more of it. It is from blood that the carnivores are supposed to derive what they require. The animal product richest in this vitamin is milk, which seems to contain little more than sufficient for the health of the sucking animal. In plant foods, green leaves and fruits are rich in the vitamin. Especially so are cabbage leaves and oranges and lemons. Roots and tubers vary in their anti-scorbutic potency. Swede turnips are about as strongly anti-scorbutic as oranges and lemons. Carrots and beetroot are comparatively feeble. Potatoes occupy an intermediate position. Grains contain almost none, but seedlings are rich in it. The vitamin appears to be developed in the process of germination. An indication of the relative anti-scorbutic value of some of the foodstuffs that have been tested is shown by the amounts of each required to prevent scurvy in guinea-pigs. Of the following substances the amounts indicated show the daily requirements: Cabbage 1 gramme, Lemon Juice or Orange Juice 1·5 c.c.,¹ Swede Juice 2·5 c.c., Carrots 20 grammes, Potatoes cooked (vitamin partially destroyed) 20 grammes, Milk 100 to 150 c.c.

Vitamin C is more easily destroyed by heat than A or B. Cabbage leaves kept at or near boiling-point for an hour lose about 90 per cent of their anti-scorbutic value. In the process of drying some of the vitamin seems to be destroyed. Dried vegetables are stated to have little or no value for the prevention of scurvy. Rapidly-dried milk, however, may retain practically the whole of the anti-scorbutic factor originally present. Destruction by heating or drying is partially prevented in the presence of acid. The acid juice of lemons can be dried to a powder and still retain its anti-scorbutic value in this form for many months.

NATURE AND FUNCTION OF VITAMINS.

One of the most striking features of the vitamin hypothesis is the magnitude of the physiological effect produced by minute quantities of vitamins. In Hopkins' experiments on the rat, an amount of milk, the solids of which weighed less than quarter of a gramme, contained sufficient vitamin to ensure health

¹ 1 c.c. = about 24 drops.

and growth, and of this small amount of material the greater part consisted of known substances which, according to the hypothesis, are inactive. The amounts of vitamin necessary for the rat are so small that, in the experiments, the food constituents used to form the bulk of the diet, and to yield the necessary energy and material, must be purified by chemical processes to ensure that the vitamins present in the foods in their natural state have been removed. Indeed, an investigator, Röhmann, in 1916, working with what he regarded as pure proteins, carbohydrates, fats, and salts, came to the conclusion that these were sufficient to sustain life, and that it was unnecessary to assume the presence of some unknown essential factors. It has been pointed out, however, that he failed to appreciate the difficulty of removing every trace of vitamins from the diets he used. It is obvious that the amounts of the unknown substances that must be present to secure health are surprisingly small.

Although a certain amount of information is available as to the chemical and physical properties of vitamins, they have never been isolated from the substance with which they are associated or combined, so that their chemical composition is unknown. Their origin is also obscure. They are most abundant in the actively growing parts of plants, and it is reasonable to suppose that they are formed there. Experimental results indicate that the animal body cannot produce them, so that those present in the milk and in other animal products must have been supplied in the food. An interesting fact in this connection is that the egg contains little or no Vitamin C, and yet it produces a healthy chicken. The growing embryonic chicken must therefore either be able to synthesise Vitamin C or to exist without it.

Nothing very definite is known about the methods whereby vitamins exercise their beneficial influence. They may supply indispensable constructive material required in very small quantities for growth and repair, or they may act as stimulants. It has been suggested that they influence the activities of certain structures in the body known as ductless glands, which produce secretions that profoundly affect growth and health. All the suggestions made, however, are as yet largely speculative. Further investigation is required before any definite statement can be made regarding the origin, chemical composition, or mode of action of vitamins.

THE BEARING OF THE VITAMIN HYPOTHESIS IN STOCK-FEEDING.

The foregoing statement has been intentionally restricted almost entirely to the results of investigations conducted upon small animals such as rats, guinea-pigs, and pigeons,

which, during the experiments referred to, received a monotonous diet, consisting either of a food from which something had been abstracted, as in the case of pigeons fed on rice from which the outer layer had been removed, or of a mixture of specially-prepared constituents of food. This account of what may be called laboratory experiments was necessary for a clear presentation of the known facts, because it is from carefully-conducted experiments of such a nature that our information on the subject of vitamins has been obtained. Before attempting to discuss the practical significance of the vitamin hypothesis and its bearing on agricultural practice, it is necessary to consider first, whether farm animals exhibit the same susceptibility to vitamin deficiency as rats, guinea-pigs, and pigeons; and second, whether feeding-stuffs used for farm stock contain so little of the unknown substances that there is a danger of a vitamin deficiency arising in any combination of feeding-stuffs commonly used.

Susceptibility of Farm Animals to Vitamin Deficiency.—One of the most striking features of the results of vitamin experiments is the different degree of susceptibility shown to lack of vitamins by animals of different species. The rat will live apparently indefinitely on a diet that within thirty days will produce scurvy in the guinea-pig. The rat is so little susceptible to scurvy that it must be able to maintain itself with quantities so small that they cannot be detected by their effect on the guinea-pig, or else it must have the power of producing anti-scorbutic for its own use. The prairie dog, an animal that in its natural habitat eats grass, a food rich in all the vitamins, can continue to grow without any signs of disease for at least six months on a diet containing no appreciable amount of Vitamin C. Obviously the indiscriminate application to farm animals of results obtained on small animals in laboratories is not warranted. The only experiments that can be relied on for practical guidance in feeding farm animals are those conducted on these animals themselves.

Comparatively few experiments have been conducted on ruminants or horses. Probably the most extensive are those conducted by Theiler¹ and his co-workers in South Africa. In the course of an inquiry into the cause of lamziekte, a disease which presents many features suggestive of vitamin deficiency, these investigators conducted vitamin experiments on cattle, goats, sheep, horses, and pigs. In the cattle experiments the animals were fed on polished rice, supplemented by $\frac{1}{2}$ to 1 lb. of coarse veld hay per day, for six months, and then for a further period of six months on polished rice, with 2 lb. per day of oat straw that had been heated under pressure for two to three hours at a temperature of 125° to 130° C.

¹ The Third and Fourth Reports of the Director of Veterinary Research, Union of South Africa, 1915. Government Printing Office, Pretoria.

to destroy the vitamins present. The amount of Vitamin B present in this ration was insufficient to prevent fowls dying within four or five weeks, with the typical signs of disease associated with deficiency of this vitamin. Yet, in spite of the digestive disturbances due to the mechanical nature of the diet, the majority of the animals lived for a year, when the experiment was stopped, without showing any symptoms of disease that could with certainty be attributed to vitamin deficiency. The gastric symptoms, and the failure to put on weight which was noted, may have been partly due to vitamin deficiency. In an experiment of a similar nature on sheep, however, the addition to the ration of a generous supply of Vitamin B in the form of yeast produced no improvement on these signs of malnutrition. In any case, there is the remarkable fact that cattle can continue to live for at least a year on a ration that through lack of Vitamin B causes death in fowls within thirty or forty days. Other experiments of a like nature on sheep, goats, and horses, though not continued for such a long period, failed to produce signs which the investigators could attribute to vitamin deficiency. These investigators conclude that the vitamin requirements of these animals must be so low that it would be a difficult matter to devise a ration that would produce symptoms due to their absence.

In addition to being deficient in Vitamin B, the polished rice and straw must have been so deficient in C that it would have caused scurvy in guinea-pigs. The amount of A present must also have been insignificant. Further investigation in connection with these animals is required. From the results quoted, however, it looks as if with regard to vitamin requirements, these herbivorous animals must be placed in a special category by themselves.

There is reason to believe that vitamins can be synthesised by bacteria, and it is possible that the bacteria in the first stomach of the ruminant, and in the huge colon of the horse, can produce sufficient to render these animals largely independent of a supply in the food.

The farm animal most likely to suffer from lack of vitamins is the pig. It grows more rapidly than any other domestic animal, and the necessity of these for growth is one of the most striking features of the results of vitamin experiments. It might be assumed, therefore, that its need for these essentials would be relatively great. The supply, however, is liable to be limited. The common food of the pig consists largely of grains, which in general are deficient in Vitamins A and C, and of commercial by-products which are liable to be deprived of all three. In addition to a monotonous diet, it often suffers more or less from continuous confinement, which prohibits access to foods to which it might be attracted

by its instincts. Vitamin experiments on the pig are therefore of special interest.

Theiler and his associates in South Africa fed three pigs on nothing but polished rice, which is deficient in the three vitamins, and so poor in B that fowls fed exclusively on it died in about a month. One of the pigs died of swine fever on the 51st day. Of the other two, one died on the 130th day and one on the 160th day. In no case did any increase in weight take place. The failure to grow and the ultimate death of the pigs in this experiment cannot, however, be attributed entirely to lack of vitamin. In the polishing of rice, by far the greater part of the mineral salts is removed, and consequently the animals would suffer from mineral deficiency, and especially from lack of calcium. The dry matter of polished rice contains only about 0.01 per cent of calcium. But growing pigs of the weight of those used require for bone formation and other purposes 3 or 4 grammes of calcium per day. To get this amount from polished rice the animal would require to consume 30 to 40 kilogrammes—i.e., nearly three-quarters of a cwt. per day. It is little wonder that growth ceased and death ultimately ensued. Indeed, without attributing any importance at all to vitamin deficiency, it is difficult to understand how life was sustained so long.

At the Dairy Research Institute at Reading some carefully-conducted experiments were carried out to determine the influence of deficiency of Vitamin A in pigs. It was found that on a diet planned to exclude this factor the animals continued to grow for at least seventy days. Ultimately, however, growth ceased, and signs of defective nutrition appeared. Breeding capacity was also evidently affected, as it was found that a sow that had suffered prolonged privation of this vitamin gave birth to a litter of imperfectly-formed young.¹

At the Rowett Institute at Aberdeen a series of experiments on over a hundred pigs has been conducted to determine the cause of rickets, a disease very common in these animals. This condition has many features suggestive of vitamin deficiency, and the influence of lack of vitamins had to be investigated. The results of some of these experiments may be briefly stated.

Newly-weaned pigs seven weeks old were fed on a grain diet so deficient in anti-scorbutic that guinea-pigs on the same diet died in three weeks with typical signs of scurvy. The pigs, however, remained healthy, and increased in weight at the same rate as a control group of animals receiving swede juice (rich in Vitamin C) in addition to the diet. The experiment was continued for 111 days, by which time the average

¹ Zilva, Gokling, Drummond, and Coward. *Biochem. Jour.*, vol. xv., p. 427.

weights were: Pigs on diet deficient in Vitamin C, 140 lb.; pigs on diet with added C, 130 lb. In this experiment in both groups the mineral matter of the diet was adjusted to the requirements of the animal by the addition of salts, so that the result was not complicated by mineral deficiency.

In other experiments the influence of Vitamin A was tested. It was found that on a diet of grain and grain offal—bran, oatmeal, and crushed oats—with the mineral matter adjusted, the rate of growth and health of the animals to which cod-liver oil (especially rich in Vitamin A) was added to the diet, was no better for the first 100 days than that of those to which an equal amount of linseed oil or olive oil (poor or completely deficient in Vitamin A) was added. Indeed, growth continued on the diet deficient in Vitamin A for as long as 200 days. In the second half of this period, however, the rate of growth slowed down compared with the cod-liver oil group, and by the 200th day the appetite of the animals was markedly decreased, and signs of general malnutrition had appeared.

The point of practical importance in connection with these investigations is that during a period of three or four months of intensive fattening no deficiency of either Vitamin A or C is likely to occur in the pig on any ordinary diet, but in breeding animals kept in confinement for long periods there may appear signs of malnutrition, which until it has been otherwise demonstrated may reasonably be attributed to deficiency of one of these unknown factors. As will be shown later, it is extremely unlikely for any deficiency of Vitamin B to occur in the food of farm animals.

It may be mentioned incidentally that the investigation in which these experiments quoted were conducted brought out the fact that deficiency of mineral matter is much more likely to cause failure to grow and other signs of disease than the deficiency of vitamins, and that deficiency of mineral matter in the pig shows itself within thirty or forty days—*i.e.*, long before the signs of deficiency of either Vitamin A or C are likely to appear. The enormous value of mineral salts shown by the results quoted confirm the opinions expressed by Ingle,¹ whose writings on this subject have not received the attention they warrant.

A study of the comparatively few experiments that have been conducted on farm animals makes it clear that there is danger in applying to these, under practical conditions of feeding, results obtained on small animals in laboratories. Compared with some of these small animals, cattle and horses are relatively insusceptible to deficiency of vitamins. The only animal that is likely to suffer is the pig, and even it seems much less susceptible than the small animals used for

¹ Jour. of Agric. Sci., vol. iii., p. 22, 1908.

the experiments from which our information with regard to vitamins has been derived.

Are Feeding-stuffs Deficient in Vitamins?—One of the most striking facts brought out in connection with vitamins is their wide distribution. There is no commonly-used feeding-stuff that, in its natural condition, does not contain one or more of the three essential substances in relatively large amounts. Although only some of the feeding-stuffs have been tested, and these chiefly on small laboratory animals, it is possible to indicate the broad lines of distribution of the three known vitamins:—

- A. is abundant in green food, hay, milk, and crude cod-liver oil. It is present also in variable but in much smaller amounts in roots, tubers, and grains, and probably in straw.
- B. is abundant in whole grains and in the milling offal containing the germ, in green food and in hay. It is present also in smaller amounts in roots and tubers, and in milk.
- C. is abundant in green food and in swede turnips. It is present also in all roots and tubers, and in milk.

It is unlikely that any substantial loss of vitamins takes place in foodstuffs in silos, so that silage probably contains all that was originally present.

The feeding-stuffs likely to be deficient in vitamins are those that have been subjected to some commercial process in which part of the food rich in these has been removed, or in which by heat and oxidation they have been partially destroyed. Examples of this category of vitamin-poor substances are polished rice, flour, vegetable oils, and feeding meals and cakes made from certain commercial by-products. The vitamin value of these artificial foods is, of course, not necessarily low. In many cases it is the vitamin-poor part that is taken for human consumption, and the vitamin-rich part that is left for the manufacture of animal foodstuffs.

A consideration of the distribution of vitamins shows that all foodstuffs in their natural condition contain one or more of these essential substances in relative abundance, and that the different members of the group are so distributed that there is little difficulty in arranging a dietary that will ensure an ample supply of all three.

The danger of Vitamin Deficiency in Farm Stock.—The small degree of susceptibility of ruminants, horses, and pigs to diseases due to vitamin deficiency, and the wide distribution of vitamins in natural foodstuffs, makes the danger of lack of these essentials in farm animals under ordinary conditions of feeding somewhat remote. Animals that are grazing or receiving regularly even comparatively small

quantities of green food will obtain an ample supply of all these essential food constituents. In feeding in confinement, even without silage or fresh green food, it is unlikely that any combination of feeding-stuffs commonly used to make up a ration will show a deficiency of Vitamins A or B. It might be thought that as C seems to be largely absent in dried vegetables there would be a deficiency of it in animals receiving neither green food nor roots. But a ration of hay and grains must contain sufficient to sustain life for many months. The street horse can be maintained in health for prolonged periods on oats and hay.

If diseases due to an insufficient supply of these vitamins do occur in stock-feeding, they are most likely to appear in young growing stock, in breeding animals, and in pigs. These cases will be first discussed separately, and thereafter the means of supplementing possible deficiencies will be considered.

A more generous supply of vitamins is necessary for the young than for the full-grown animal. A slowing down of the rate of growth is one of the first signs of shortage. So long as the offspring are receiving all the constituents in the milk of a healthy mother an ample supply is assumed. When, however, the young are weaned early they are often given a sloppy feed made up largely with meals which have little or no vitamin value. If skimmed milk is used to make up the feed, the danger is largely removed. It contains about half of the Vitamin A originally present, and almost the whole of the other two.

In animals kept for breeding, two possible evil effects of vitamin deficiency may arise. It has been suggested that as a result of lack of vitamins atrophy of the generative organs and sterility may be produced. It has also been suggested that the lactating animal is dependent on the food for her supply of vitamins, so that if these are deficient in the food there will either be a lowering of the vitamin value of the milk or a decreased milk flow. Either of these, of course, would affect the health and growth of the suckling. While neither of these have been proved in the case of the farm stock, it is only prudent in arranging the ration to consider these possibilities and take the necessary precautions.

The case of pigs has already been discussed. The danger of vitamin deficiency is probably greater in these animals than in ruminants and horses. As in other kinds of stock, the evil effects of a deficient diet are more liable to appear in breeding animals and in young pigs sucking a sow whose milk is deficient owing to the nature of the diet.

There is no difficulty in making certain that any ration will contain ample vitamins. A few pounds of good hay per day will supply abundance of A, and also of B, for ruminants

and horses. A small amount of whole grain or of milling grain offal containing the germ yields a generous supply of B. An addition of roots, especially swede turnips, to the ration will ensure a sufficiency of C. Crude cod-liver oil, dried yeast, and swede turnip juice, all of which can be fed to young animals, are so rich in A, B, and C respectively, that a few table-spoonfuls per day will provide an ample supply of any of these vitamins for a farm animal. These are all substances that are available at a reasonable price, so that even if a vitamin problem exists in stock-feeding the practical solution of it is not a matter of difficulty.

From certain unfortunate statements that have been made on the subject of vitamins, the idea seems to have arisen in some uninformed quarter that vitamins are some sort of elixir of life, and that by feeding large amounts of them extraordinary rates of growth may be obtained.

It should be emphasised that vitamins are unknown substances that are assumed to be present in some foodstuffs, because these foodstuffs give protection against certain diseases. Therefore there are no grounds for believing that the addition of vitamins to a diet that is already sufficient to maintain a young animal in perfect health will exercise any beneficial influence. The results of experiments which have been carried out at the Rowett Institute show that pigs receiving a ration which contained only small amounts of vitamins, which, however, seemed to be sufficient for health, showed as great gains in weight, both per day and per pound of food eaten, as control animals receiving large quantities of additional vitamins.

SUMMARY AND PRACTICAL CONCLUSIONS.

The vitamin hypothesis is so recent and so much out of keeping with formerly held views that it has been necessary, in an attempt to bring out the salient facts, to enlarge in such detail on certain aspects of the subject that it may appear more complicated than it really is. The new conception of nutrition is, in fact, quite simple. In addition to constructive material for growth and repair, and combustible material for body-heat and energy, the body requires for the preservation of health, certain as yet unknown substances. These unknowns, which have received provisionally the name vitamins, are required only in very small quantities, and fortunately are present to some extent in all foodstuffs in their natural condition.

The practical conclusions that would obviously be drawn from the vitamin theory only confirm in many cases what is already known. On the valuation of foodstuffs in accord-

ance with their vitamin content, pasture grass is better for growth, milk production, and health than the usual winter feed; alfalfa and clover are more valuable than the grasses; hay, cut early while there is still an abundance of green leaf, which is the part rich in Vitamins A and C, is more valuable than hay allowed to grow until it consists largely of stem and seeds; roots and tubers, especially swedes, are excellent for the health of the stock; whole milk is better for young animals than skimmed milk, from which the fat containing most of Vitamin A has been abstracted; cod-liver oil is an excellent substitute for milk-fat, and in all cases is valuable for young growing animals.

The experienced farmer is not much enlightened by these suggestions. What the vitamin theory does is to emphasise the danger of monotonous diets of what might be termed artificial feeding-stuffs, and the need for care in arranging the diet of breeding animals, especially those kept in confinement, and of young growing animals deprived of their mother's milk. It also points to the desirability of allowing all animals a supply of green fodder. Further, it offers a partial explanation for the known beneficial effects of certain foodstuffs. It should be pointed out, however, that the good effects on nutrition of most of these does not depend wholly upon vitamins. The mineral content, the protein value, and in some cases the physical nature of such foods as clover pasture, affords sufficient and understandable reason for their known good nutritive value.

Although scientific interest in the vitamin hypothesis is undoubtedly great, its probable practical value to the agriculturist is as yet difficult to assess. So far as present information is available, it would appear that the farmer himself is much more likely to suffer from vitamin deficiency than the animal he feeds. Mankind seems more susceptible to the lack of these unknown substances than cattle or horses, and his food as a rule contains much less. In highly-civilised countries human food is composed chiefly of material such as flour, from which the vitamin-rich part has been removed with the outer layers of the grain in the process of manufacture; and further, most of it is subjected to cooking or preserving processes that tend to diminish the vitamins originally present. The continued existence of the human race through many generations that were unaware of the existence of vitamins shows that there is no need for alarm or precipitate haste on the part of the farmer to make radical changes in the accredited principles and practices of food husbandry on account of our recently-acquired knowledge of vitamins. At the same time agriculture, which is the most scientific of the great industries, must keep itself informed of all advances in knowledge, especially in the biological

sciences. The recent advances made in our knowledge of nutrition by the study of vitamins deserve his attention. Though much is still uncertain, it is worth while taking the trouble to make sure that in the food of the farm stock there is no deficiency of vitamins, especially as a ration that contains an abundance can usually be arranged with little or no extra cost.

Note.—Further and more detailed references to the experimental work on which this article is based will be found in ‘Report on the Present State of our Knowledge concerning Accessory Food Factors (Vitamins),’ by the Medical Research Committee, H.M. Stationery Office, 1919 ; and in an article entitled “Vitamins,” ‘Physiological Reviews,’ Vol. I., No. 4, Waverly Press, Baltimore, U.S.A., 1921.

A more popular account of the influence of vitamins on health and growth is given in ‘The Newer Knowledge of Nutrition,’ by M‘Collum, 1920 (Macmillan).

THE OIL AND PETROL ENGINE ON THE FARM.

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IN the following article it is proposed to deal with the actual working conditions of oil and petrol engines such as are generally used for operating agricultural tractors and farm machinery; engines of this type are termed internal combustion engines.

The internal combustion engine is so called because the combustion or burning of the fuel—liquid or gaseous—takes place inside the engine cylinder, and in direct contact with the moving piston. In the steam engine the fuel is burnt in the furnace of a boiler which is external to the engine. It is therefore obvious that in the internal combustion engine there should be a larger return, in the shape of mechanical work, from a given expenditure of fuel than can be obtained from a steam engine and boiler plant, and in practice this is found to be the case.

Engines designed for the purpose under consideration are of the single-acting type—that is, the pressure due to the explosion of the charge acts on one side of the piston only; in the steam engine the pressure acts on either side of the piston alternately. The engines are either horizontal or vertical, and may have one or more cylinders; agricultural tractors are usually fitted with four-cylinder vertical engines.

For the purpose of arriving at a clear understanding as to the conditions under which an engine should work in order that the best and most economical results may be obtained, it will be necessary to consider the principle of action involved.

All heat engines are designed with the object of converting into mechanical work as much as possible of the heat evolved by the more or less complete combustion of the fuel, which may be solid, liquid, or gaseous.

The principal heat-producing element in a fuel is carbon; there is in addition a certain amount of hydrogen present, but its proportion is relatively small. In the case of complete combustion, the carbon in the fuel is burnt to form carbonic-acid gas, with the maximum evolution of heat. On the other hand, if the combustion is only partially complete, a certain amount of carbonic-oxide gas will be formed in addition to the

carbonic-acid gas. The carbonic-oxide gas is itself combustible, and if the conditions are favourable may be burnt giving off heat ; but as a rule, if this gas is formed in an internal combustion engine, it will pass away with the exhaust gases, and its heat be lost.

The combustion of a fuel is brought about by the combination of oxygen with the heat-producing elements of the fuel, carbon and hydrogen. This oxygen is obtained from the air, and it is therefore of the utmost importance that the fuel should be mixed with sufficient air to bring about complete combustion. At the same time, care must be taken that the air is not in excess, which would cause the mixture to be too weak, resulting in loss of power and low efficiency. It is therefore absolutely essential that every care should be taken to maintain, as closely as possible, the correct proportion of the admitted air to the fuel required by the engine. The want of strict attention to this important matter will certainly result in inefficient and uneconomical running of an engine, which generally receives the blame, while the operator is usually at fault. The precautions to be taken to ensure proper working of an engine will be considered later.

The fuel used in internal combustion engines, as adapted for farming operations, is either petrol, benzol, or paraffin oil. The fuel must be broken up into exceedingly fine particles, or vaporised, before being mixed with the air necessary for its combustion. Imperfect vaporisation is the cause of much bad working in an engine. The vaporised fuel is of the same composition as the parent liquid ; it differs only in respect to its physical state, being changed from a liquid to a vapour.

Petrol and benzol may be vaporised by the mechanical action of a very rapidly-flowing current of air, and the process can be accelerated by the action of heat, which must not be carried to excess, or it may have a detrimental effect on the petrol. Petrol and benzol are vaporised in a carburetter, which is designed to cause a current of air to act on the issuing jet of fluid, and to break it up. When using benzol as a fuel it is desirable to heat the carburetter.

In order to vaporise paraffin oil, heat is necessary, and the fuel is injected into a vessel, termed a vaporiser, which is maintained at a sufficiently high temperature to convert the oil into a vapour, just as heat is required to transform water into steam, which is simply water in a different state.

Petrol and paraffin oil are complex hydrocarbons, the constituents of which have different boiling points, and this fact affects the vaporisation. The conditions that will effectively vaporise a fuel of low boiling point will not be sufficient to deal efficiently with one having a higher boiling point. Since the constituents of ordinary petrol may have boiling points varying from 150° F. to 250° F., and commercial paraffin oil

from 300° F. to 500° F., it will be obvious that the vaporisation of the various constituents of either fuel presents certain difficulties, which are receiving the constant attention of engine-makers, with more or less success. Although the results achieved are not yet quite perfect, there is no doubt that at the present time the vaporising arrangements supplied to engines give very satisfactory results, though there is still room for improvement. Unless a fuel is properly vaporised it cannot mix intimately with the admitted air, with the result that the combustion is not complete, and it is probable that a fairly large proportion of the fuel may be lost.

It is therefore obvious that the vaporisation of the fuel is a matter requiring serious attention from the user of an engine, and full consideration will be given to it later on.

PRINCIPLE OF ACTION.

Four-stroke Cycle.—The majority of internal combustion engines work on what is called the Otto or “four-stroke” cycle. In this cycle the first out- or down-stroke of the engine piston allows a charge of air and vaporised fuel to enter the cylinder through a valve or valves. The piston is then driven inwards or upwards by the action of the crank, compressing the charge, which is ignited by an electric spark or other suitable means, the piston then being practically at the end of its stroke. The explosion of the charge results in a high pressure, which forces the piston outwards or downwards doing work in driving the engine. During the compression and working strokes the valves leading into or from the cylinder are closed, so that nothing can enter or leave the cylinder. Just before the piston reaches the end of the working stroke the exhaust valve is opened, and the products of combustion can now leave the cylinder; during the fourth or exhaust stroke this valve remains open, and the products of combustion are expelled.

In this cycle there are thus four strokes, only one of which is an operative or working stroke, or one working stroke for every two revolutions, since there are two strokes for each revolution of the engine crank.

The “four-stroke” cycle may be represented as follows :—

- | | |
|-----------------------------|---------|
| 1. Charging stroke . . . | (out) → |
| 2. Compression stroke . . . | (in) ← |
| 3. Working stroke . . . | (out) → |
| 4. Exhaust stroke . . . | (in) ← |

Two-stroke Cycle.—In the “two-stroke” cycle, which is now being considered very favourably by engineers, there is

one working or power stroke for each revolution of the crank. Consequently, with two engines of the same size and equal speed, the "two-stroke" engine should develop twice the power of the "four-stroke" engine; as a matter of fact, the proportion is somewhat less than two to one, but considerable improvements are being made on this type of engine, and much may be expected from it in the future. At the present time many small engines made on this principle and very suitable for farm work are on the market.

In the "two-stroke" engine the usual charging and exhaust strokes, as described above, are omitted. Instead of the ordinary inlet and exhaust valves as generally adopted in the "four-stroke" engine, there are two openings made on opposite sides of the cylinder body, and which are uncovered by the piston when it is almost at the end of its outward stroke. One of these openings allows the charge to enter the cylinder; the other enables the exhaust gases to escape. The first opening communicates with the crank chamber through a transfer port or passage. While the piston is making its working stroke, the contents of the crank chamber, which has been previously filled with a combustible mixture during the upstroke of the piston, are being slightly compressed, and when the inlet opening is uncovered a charge passes from the crank chamber into the cylinder. A little before this takes place the exhaust opening is uncovered, and a large portion of the spent gases leave the cylinder, the remainder being more or less expelled by the incoming fresh charge. It is perhaps obvious that, on account of the two openings being practically uncovered by the piston at the same time, some of the incoming charge may escape with the exhaust gases and be lost. As a matter of fact, this does occur, consequently the fuel consumption of "two-stroke" engines per brake-horse-power per hour is somewhat higher than in the case of the "four-stroke" engine, but this drawback is being overcome, especially in engines of large power, and it is very possible that this type of engine will be used to a considerable extent in the near future for agricultural operations. It is a simple form of engine, and for equal power its weight is less than the "four-stroke" type.

EFFICIENCY OF ENGINES.

It is probable that the ordinary user of an engine has little or no knowledge regarding the amount of heat contained in the fuel that can be converted into actual work, and it is desirable that an attempt should be made to make this matter clear.

At the beginning of this article reference was made to the

function of an engine—the conversion of heat into mechanical work—and it should be borne in mind that in the case of a theoretically perfect oil engine of the usual type, not more than 40 per cent of the heat contained in the fuel can be converted into useful work; a return of 30 per cent would be an excellent performance. The above figures represent what is termed the heat or thermal efficiency of the engine—that is, the ratio of the work done to the heat supplied.

Theoretically, as well as practically, the efficiency of an engine increases with the pressure to which the charge is brought at the end of the compression stroke. Unfortunately, in actual practice there is a certain well-defined limit to which the charge may be compressed, and this limit is determined by the pressure and temperature at which the charge will ignite spontaneously—that is, without the aid of an electric spark or other external means.

In engines using ordinary paraffin oil as a fuel this compression pressure of the charge before ignition should not exceed 70 lb. per square inch, and in petrol engines the compression may be carried a little higher.

At the same time, it is as well to point out that liquid fuels may vary considerably in their composition, and a compression pressure that is safe with one brand of oil may be too high for another.

This fact is often a source of trouble to a man in charge of an engine, which hitherto has worked quite satisfactorily with a certain variety of paraffin. A different kind is got—perhaps the former brand is not procurable—and the engine soon begins to work badly. Pre-ignition occurs—that is, the charge ignites spontaneously before the passage of the electric spark—and a severe thud or knock is heard. When pre-ignition takes place the piston is moving towards the inner end of the cylinder, compressing the charge by means of some of the energy previously stored up in the moving parts of the engine. Consequently the pressure due to this premature ignition of the charge acts against the direction in which the piston is moving, causing a knock, which in course of time may become very serious. This adverse action sets up dangerous stresses in the working parts of the engine, and it has been known to result in the fracture of the connecting-rod or crank. “Knocking” in an engine is always dangerous, and if it develops attention should be given at once.

The compression pressure depends upon the relation of the compression space—that is, the volume contained between the end of the cylinder and the piston, when the latter is at the beginning of its stroke—to the total cylinder volume. In a certain make of engine this space may be varied, within limits, by means of compression blocks, which are fitted to the vapouriser end of the cylinder. If the engine begins to

knock, a new compression block is fitted in, which increases the compression space, and thus reduces the compression pressure, and it is generally found that the "knock" may be stopped in this way.

The "flash-point" of a liquid fuel is also an important factor, and requires some consideration. The "flash-point" is that temperature at which a liquid fuel gives off inflammable vapour. In the United Kingdom the legal "flash-point" is 73° F., and no fuels having a "flash-point" lower than the above can be sold unless under special conditions as to storage, &c. The "flash-point" of petrol is below 73° F., and that of ordinary oil is about 105° F. A small difference in the "flash-point" of an oil has a considerable influence on the pressure to which the charge may be compressed in an engine cylinder; a lowering of the "flash-point" necessitates more than a corresponding reduction in the compression pressure in order to prevent pre-ignition.

ENGINE TROUBLES AND REMEDIES.

Pre-ignition.—Spontaneous ignition, due to excessive compression or to the nature and composition of the charge, has already been dealt with, but it is desirable to consider the matter a little further.

It is highly improbable that a maker would supply an engine in which there was a possibility of pre-ignition as the result of faulty design; therefore it is necessary to look for other causes.

During the compression the temperature of the charge rises very rapidly, and the ultimate temperature, which may bring about spontaneous ignition, depends upon the temperature of the charge at the beginning of compression, and the temperature of the cylinder itself. A hot cylinder will have a greater tendency to cause pre-ignition than one that is comparatively cool; a cylinder may become unduly hot because of a defect in the cooling system.

Cylinder Cooling.—In a tractor the cooling water is usually circulated through the cylinder jackets and radiator by means of a centrifugal or other suitable pump, which may get out of order, or the pipe connections may be defective. These connections are often made with rubber or leather washers, which may not allow of a free passage of the water, through the hole in the washer not coinciding with the bore of the pipe.

Running an engine for too long a time with the ignition retarded will also cause overheating.

The *cooling water* should be free from lime or other salts held in solution, since these salts are apt to be deposited in

the form of a thin scale upon the interior of the pipes and radiator, and in consequence the cooling action of the circulating water will be greatly reduced. This scale may be removed by mixing some caustic potash or soda with the cooling water, and allowing the engine to run for about two hours. The whole of the water should then be run off, and the entire circulating system washed out with clean water to remove all traces of the potash or soda; when this has been done a fresh supply of pure water can be introduced.

Carbon Deposits.—These deposits, which are the result of using too rich a mixture, form on the top of the piston and valves and inside the cylinder head. This carbonaceous matter is liable to become incandescent during the working of the engine, and bring about premature ignition. The presence of too much lubricating oil in the engine cylinder will have the same result—i.e., carbon deposit.

Colour of Exhaust Gases.—It is important to give occasional attention to the character of the exhaust gases being discharged from the engine. If the mixture is too rich these gases will be dark in colour, due to the presence of unconsumed carbon. In appearance they will be not unlike the smoke coming from an ordinary chimney. On the other hand, excessive cylinder lubrication gives a bluish colour to the exhaust gases. In either case the remedy is obvious.

The vaporiser of an oil engine can vaporise efficiently only a definite quantity of the fuel, and if an excessive amount is being supplied, the unvaporised portion, which will not be burnt, passes away with the exhaust gases. The presence of unburnt paraffin oil may be detected by holding a handkerchief or cloth for a short time at the outlet of the exhaust pipe, when the small particles of the oil will be caught and its distinctive odour easily recognised.

Fuel Supply.—When an engine is running at its required power, the fuel supply should be cut down as much as possible. As soon as the engine shows signs of labouring or slowing down, indicating that the quantity of fuel is not equal to the work to be done, a very small increase in the supply is generally sufficient to keep the engine running at a steady speed. By giving strict attention to the fuel supply, economical running of an engine is obtained.

It is obvious that the fuel required by an engine will depend upon the power demanded from it; consequently it is necessary to keep the fuel supply under constant observation; otherwise the cost of running the engine will become excessive.

Air Supply.—It is also important that the quantity of air being drawn into the cylinder should be in correct proportion to the fuel supplied. Too much air is almost as bad as too little. A weak mixture results in reduction of power and

delayed combustion; the latter may cause overheating of the cylinder, also back explosions in the induction pipe and carburetter. An explosion in the pipe between the cylinders and the carburetter is invariably due to a weak mixture.

Air Regulation.—On starting up an engine, when everything is at a low temperature, a rich mixture is necessary, and the quantity of air admitted should be reduced. As soon as the engine is under way, the air supply may be gradually increased, the fuel supply receiving attention at the same time.

When the engine is working under load the thud of the explosions should not be too sharp. If the explosions appear to be violent, it is possible that the ignition is taking place too early, and the regulating device in connection with the magneto should be adjusted to give a later ignition. Should this be ineffective in stopping the trouble, it is possible that the mixture is wrong, and attention should be given to the fuel and air supplies, which may need a slight adjustment.

Misfiring; Care of Sparking-plugs.—Very frequently an engine gives trouble through the charge in one or more cylinders failing to explode, resulting in loss of power. Usually this defect is quite easy to detect, since the regular order of the sound of the explosions in the engine will be broken, and it is not difficult to locate the particular cylinder or cylinders that are at fault.

Misfiring is generally due to a failure in the ignition system, and the wires leading to the sparking-plugs should receive first attention. It may be that a wire has become disconnected either from a plug or from the magneto, or it is possible that the insulating material surrounding the wire has been burnt off or broken, in which case the electric current will pass direct to the cylinder casting and fail to reach the plug. In either case the remedy is obvious. As these wires convey current having a high voltage, it is necessary that they should be well insulated. Special wiring is provided for this purpose. Care should be taken that the high-tension wiring does not come into contact with any hot part of the engine, or the insulation is apt to be destroyed.

Assuming that the wires and their connections are intact, it is necessary to examine the plugs. The points, between which the spark passes, may be fouled or bridged over with lubricating oil or carbonaceous matter, the result of over-lubrication or the mixture being too rich, and the current will pass through this deposit without a spark being emitted.

The exposed part of the plug and the points should be carefully cleaned, and it may be necessary to rub the points slightly with very fine emery cloth. At the same time, the points should be examined to see that they are not too far apart, otherwise the spark may not be able to jump across.

The gap between the points should be from $\frac{1}{8}$ to $\frac{1}{2}$ of an inch in width, and a gauge can be obtained for setting the points to the best distance apart.

Attention has already been drawn to the necessity of complete combustion of the charge in order to obtain the maximum amount of work out of the engine, and in this connection it is important to note that the combustion of the charge largely depends upon the character of the spark, which should be of ample body, or what is generally known as a "fat" spark. A feeble spark may *ignite* the charge, but it does not possess a sufficient quantity of heat to bring about complete or perfect ignition, and the combustion is incomplete.

It is a common practice to test the plugs by laying them—wired up to the magneto—on the cylinder heads, and if, on cranking round the engine by means of the starting handle, sparks are seen to pass between the points, it is generally assumed that the ignition is correct, but such may not be the case; a spark may pass between the points under the above conditions, and fail to pass when the plugs are in the cylinder, where the pressure is much higher and the resistance greater, so that it is necessary in addition to test the plugs when they are screwed into position.

The insulation within a plug may break down, in which case there will be no passage of a spark between the points, and it is necessary to put in a fresh plug. The writer has known of plugs that sparked when tested on the cylinder head, as mentioned above, but failed when screwed into place. This was due to the insulation breaking down only when the plugs were screwed home, and recovering on being taken out. It is advisable to keep a supply of fresh plugs, and in the event of trouble to replace the faulty plug with a new one, and thus save valuable time.

All plugs are not alike, and it is desirable to ascertain the particular make that gives the best results in a given engine.

It is therefore of the utmost importance that constant and most careful attention should be given to this part of the engine.

Misfiring may also be caused by using too weak a mixture, or a shortage in the fuel supply, but in this case it is not confined to a particular cylinder, but is general throughout the engine. There may be a choke somewhere in the fuel supply system, or the fuel tank may require replenishing.

Misfiring may result from the "make" and "break" points in the magneto not touching properly, but this matter will be fully considered under "Magneto."

CARBURETTERS AND FUEL SUPPLY.

The essential parts of the carburetter are the float chamber, jet or jets, air-supply regulation, and the throttle valve. In the float chamber there is a float which is designed to give a more or less constant level of the fuel in the jet, no matter what power or speed is being developed by the engine. This is not a simple matter, and while the perfect carburetter has yet to be produced, there is no doubt that the carburetters at present in use are capable of giving excellent results.

The level of the fuel will depend upon the depth to which the float sinks in the liquid, and this depth is determined by the weight of the float and the density of the fuel; consequently as the density of the fuel increases the float will not sink so far, and there will be a lowering of the level in the jet. For example, a float giving a correct level for petrol may not give good results when benzol is used, since benzol has a higher density than petrol.

When an engine is *not* running the level of the petrol should be about one-eighth of an inch *below* the orifice of the jet.

The part of the carburetter immediately surrounding the jet orifice is constricted in area; this part is called the "choke-tube."

The air necessary for the combustion of the fuel is drawn in, by the action of the engine pistons, through an opening in the lower part of the carburetter. As the air rushes through the choke-tube a zone of low pressure is created in the vicinity of the jet orifice. The fuel, being under atmospheric pressure in the float chamber, is forced through the jet, from which it issues in the form of a fine spray. This spray mixes with the air passing along the choke-tube, and is broken up into still finer particles, so that it is somewhat mist-like in character. The after combustion of the fuel is rendered more perfect by its being broken up into as small a state of division as possible.

The quantity of air entering the carburetter is controlled by the throttle valve, which is placed between the choke-tube and the intake to the engine.

In the event of the level of the fuel in the jet being too low, there will be a loss of power, because the flow of fuel from the jet is insufficient to meet the demand from the engine. To correct this, add a little weight to the float in the shape of a thin lead washer, which should be placed on the top of the float and the needle valve stem passed through a hole in the centre of the washer. If the washer is found to be too heavy, thereby raising the level of the fuel too high in the jet, and probably causing the fuel to flow from the jet when the engine is not running—this is known as "flooding"

—a little can be pared off the washer with a knife until the correct weight is obtained, in which case there should be no flooding at the jet.

Occasionally the float leaks, and some of the fuel finds its way inside, thus increasing the weight of the float, thereby raising the level in the jet, causing persistent flooding when the engine is standing, also resulting in too rich a mixture and loss of fuel.

A leaky float can be easily repaired by any one, provided he has a slight knowledge of soldering. Remove the float and immerse it in a vessel of hot water, when bubbles of vaporised fuel and air will be seen to issue from the leak—usually a very small hole—and its position marked. As soon as the position of the leak is discovered, the float should be turned until the leak is in the lowest position, when the fuel will be forced out more readily. When the float is completely empty, the hole can be easily stopped by means of a little solder. Do not bring a float containing fuel near to a fire or naked flame, or an explosion may occur.

Carburettors are generally supplied with spare jets having orifices of different sizes, and in the event of an engine showing lack of power, for which there is no apparent cause, an increase in the size of the jet may overcome the trouble. If the engine appears to be getting too much fuel, it is advisable to try a smaller jet.

Although the makers of an engine usually specify the size of jet to be used, it is desirable to carry out a personal investigation, and ascertain the size that gives the best result with the particular conditions under which the engine may be working. It is quite possible that the jet may not be suitable for the fuel being used, and a few experiments will soon put the matter right. A correct adjustment of the float and jet is absolutely essential for efficient and economical working of an engine.

It should have been mentioned that the sinking of a leaky float, due to its increased weight, keeps the needle valve up, and allows unrestricted flow of the fuel into the float chamber.

A common cause of "flooding" is the presence of some foreign matter between the needle valve and its seat, or the seating may be defective. Either of the above will prevent control of the entering fuel, and attention must be given to remove the cause of the trouble.

Depressing the float by hand should bring about a flow of fuel from the jet. If, on depressing the float, the fuel does not flow, there is a stoppage either in the jet or in the pipe connecting the float chamber with the supply tank.

A stoppage in the jet may be caused by a small piece of dirt or by a drop of water. If there is no flow into the float chamber, the obstruction is in the supply pipe, which must

be disconnected. In most cases the cause of the stoppage can be removed by blowing through the pipe. If there is a free flow to the float chamber, the jet must be taken out and cleaned.

Sometimes the stoppage is intermittent, in which case, by racing the engine, the vigorous flow through the jet may force out the obstruction.

It is most important that the fuel should be poured through an efficient filter when filling the supply tank, and great care must be taken that no water enters with the fuel.

IGNITION SYSTEM.

Magneto.—The necessary electric current for producing the spark by which the charge is ignited is usually supplied by a high-tension magneto. The magneto consists of a steel horse-shoe magnet or magnets, provided with cast-iron pole pieces, between which an armature revolves, being driven off the engine. The armature is constructed with a soft iron core round which layers of insulated copper wire are wound. The winding immediately next to the core consists of moderately thick wire, and forms what is called the primary winding, in which a low-tension current is induced, when the core of the armature cuts through the lines of magnetic flux or force acting between the poles of the magnet. Outside the primary winding there are very many turns of fine wire, called the secondary winding, in which a high tension alternating current of electricity is induced from the primary. One end of the secondary winding is connected to the primary and the other end to a continuous brass segment let into a grooved disc of non-conducting material mounted on the end of the armature spindle; this arrangement is usually called the "slip-ring." A carbon brush in contact with the brass segment picks up the high-tension current, which is then conveyed to the insulated metal spindle of a revolving distributor furnished with a carbon brush.

In front of the magneto and attached to the armature spindle there is a contrivance known as the *contact breaker*. The object of the contact breaker is to make and break the current of electricity flowing in the primary circuit at such a point as will give the most intense spark at the plug or plugs.

The contact breaker consists of a little rocking lever carrying a small piece of platinum, which is made to touch another piece of platinum fixed to the plate of the contact breaker. These two pieces constitute the *make* and *break* points, and when they are in contact the primary circuit is complete. On separating the points the circuit is broken. In a four-

cylinder engine the "make" and "break" occurs twice in each revolution of the armature.

Most ignition troubles, other than those already dealt with, are traceable to the contact breaker.

The contact points are apt to wear away on account of the great heat of the electric spark that passes between them when contact is broken. Unfortunately the wear is not even, and the points do not touch fair and square, resulting in loss of power in the engine and misfiring. When the points are found to be worn they should be touched up with a special file for the purpose. Means are also provided for adjusting the points, and this may require to be done from time to time.

The rocking lever referred to above is mounted on a pin fitting in an insulated bush fixed in the contact breaker plate. This pin may stick in the bush and hold the "make" and "break" points apart. The lever and its pin can be taken out easily, and the matter may be put right by simple cleaning. Sometimes the pin is too tight a fit in the bush, in which case the hole in the bush may be eased slightly by means of a piece of very fine sand-paper twisted into a thin roll. On no account must the pin be filed.

Care must be taken not to over-lubricate the contact breaker, or in fact any part of the magneto. Too much oil may cause a lot of trouble, and the maker's instructions in this connection should be followed strictly.

The magneto is a delicate piece of apparatus, and requires very careful attention. It must be kept scrupulously clean and free from dust. Should the magneto develop faults other than those already dealt with, do not attempt to take it to pieces, but send it to the makers. Irreparable damage may be done by unskilled hands.

We will assume that the tractor is being driven by a four-cylinder engine. The magneto will then have four terminals to which are attached the wires conveying the high-tension current to the respective sparking-plugs. Connection is made with each terminal through the revolving distributor driven from the armature spindle by toothed wheels. The compressed charges in the cylinders are usually fired in the following order: 1, 3, 4, 2. No. 1 cylinder is the one nearest the radiator, and in connecting up the sparking-plugs to the terminals on the magneto, care must be taken that the above order is maintained. Any terminal on the magneto may be connected to No. 1 plug, but the next terminal that is in indirect contact with the distributor as it revolves must be connected to No. 3 plug, and so on.

The distributor usually consists of a carbon brush, which, as it revolves, comes into contact—one after the other—with four brass plates connected to the respective terminals. These brass plates are insulated from one another. If these

plates become covered with dirt, contact between them and the carbon distributor is bad, and the engine is likely to misfire. It is therefore important to examine the distributor occasionally to see that it is clean.

The plate carrying the contact breaker can rotate through a small arc by means of a lever on or near to the steering wheel. This rotation varies the point at which the "make" and "break" takes place, and thereby alters the point of ignition in the engine.

On *advancing* the ignition by the method referred to above, the spark is made to occur at an earlier point of the compression stroke in each cylinder, and this will bring about a slight increase in the power developed by the engine. To obtain the maximum efficiency from an engine—assuming there is correct proportion of fuel and air—it is desirable to advance the ignition by moving the controlling lever very slowly notch by notch, with several seconds' interval between. This gives the engine an opportunity of augmenting its power and speed gradually.

If the ignition is too far advanced, "knocking" will be set up, and the lever should be put back a few notches until the "knocking" disappears.

It is an essential factor of engine control that the ignition should be advanced as the speed increases.

Retarding the ignition has the opposite effect to the above, and the initial firing of the charge will probably take place in the early part of the working stroke, when the piston is just moving away from the inner end of the cylinder; the power and speed of the engine is thereby reduced. If the engine is allowed to run too long with the ignition retarded, the cylinders are apt to become overheated, on account of the combustion of the charge being prolonged throughout the greater part of the working stroke; and it is possible, with the ignition fully retarded, for the gases to be still burning when being forced out of the cylinder during the exhaust stroke. It is therefore obvious that retarding the ignition too much will result in loss of engine power and efficiency.

The effect of an advanced spark—as compared with normal ignition—is to bring about an increased pressure on the piston, which is made to move thereby at a greater velocity, while a retarded spark results in a diminished pressure with a corresponding reduction in the speed of the engine.

IGNITION AND VALVE TIMING.

When an engine has been taken to pieces for the purpose of cleaning and overhauling, and the parts again put together, it may be discovered afterwards that the ignition does not

take place at the proper time. Incorrect "timing" of the ignition will result in possible "misfiring" in the cylinders, also loss of power, and it is quite possible that the engine may refuse to work.

Assembling an Engine after Overhaul.—Before taking down an engine the intermeshing teeth on the timing and other gears should be marked with a centre-punch, so as to indicate where the teeth must mesh when the wheels are again assembled; if this most important matter is overlooked it is very probable that the "timing" of both ignition and valves will not be correct.

Piston Positions shown on Flywheel.—To facilitate the "timing" of an engine, either for ignition or for valve operations, it is desirable that the flywheel rim should be marked in such a way as to indicate when the pistons are at the top and bottom of their respective strokes; this is done by some makers before the engines leave the works, and it is a great convenience.

To obtain the necessary piston and crank positions on the flywheel rim, proceed as follows: Turn the crank-shaft round until the piston in No. 1 cylinder is at the beginning of its admission or suction stroke; the corresponding crank will then be on its top dead centre (T.D.C.). Take a cold chisel and make a slight cut on the rim of the flywheel as near to the top as possible, also make a corresponding cut on the engine frame, so that the two cuts coincide. Then give the crank-shaft half a turn, which will bring the piston to the bottom of the stroke, and the crank to the bottom dead centre (B.D.C.). Make a cut on the flywheel rim opposite to the previously made cut on the engine frame, also stamp on the rim (T.D.C.) and (B.D.C.) alongside the two cuts.

Since cranks No. 2 and No. 3 are both half a revolution in advance of cranks No. 1 and No. 4, it is obvious that when crank No. 1 is at top dead centre, crank No. 2 will be at bottom dead centre, and so on.

To find when a crank is at the top dead centre, take out the plug in the cylinder head, and insert a straight piece of thick wire, maintaining it in a vertical position. The lower end of the wire will rest on the top of the piston, and on turning the crank-shaft the wire will be pushed up by the piston, the crank being on its top dead centre as soon as the wire ceases to have any further upward motion. By turning the flywheel through an equal angle on either side of the above position, and measuring the amount the wire moves in each case, it is quite easy to fix an intermediate point, which will be approximately correct.

If access can be obtained to the crank-case—by removing a cover at the side—the bottom dead centre position of the crank can be readily ascertained, and by marking off the semi-

circumference of the flywheel rim from this position the top dead centre is determined.

Valve Timing.—It is also an advantage to have the flywheel rim marked in such a way as to indicate when the valves open and close, but as the valve "timing" varies somewhat in different makes of engines, it is not possible here to give any definite instruction on the matter. If, however, it is considered desirable to mark the flywheel for valve operations—assuming the "timing" to be correct—remove the valve cover or covers on No. 1 cylinder, and turn the crank-shaft until the inlet valve just *begins* to lift; then make a chisel cut on the flywheel rim opposite the cut on the engine frame, stamping the rim with I.V.O. (inlet valve opens). In the same way make cuts on the rim to show positions when the same valve closes, also for the opening and closing of the exhaust valve; all for No. 1 cylinder. Since it is usual for all the valves to be operated by cams which form part of a common shaft, it is certain that if the "timing" for No. 1 cylinder is correct, the remaining cylinders will also be in order.

It will be noticed that the cam-shaft, referred to above, is driven at half the speed of the crank-shaft by means of three toothed wheels, of which the wheel on the cam-shaft has twice as many teeth as the wheel on the crank-shaft. Between these two wheels there is an intermediate wheel, which plays an important part in valve setting. If the valve timing is incorrect, the following procedure should be followed to put it right: Remove the valve-cover, and turn the crank-shaft until the mark I.V.O. is in line with the mark on the engine-frame; the inlet valve should then be just opening—if it is not, and shows no signs of opening, remove the intermediate wheel, the crank-shaft remaining in the same position with the two marks in coincidence, and turn the wheel on the cam-shaft until the inlet valve begins to rise; then put back the intermediate wheel so as to mesh with the other two. The valve timing should now be correct.

The inlet valve usually begins to open when the corresponding crank is about 10 degrees *after* T.D.C., and the exhaust valve opens when the same crank is about 45 degrees *before* B.D.C.

In some engines the cam-shaft is driven by means of a chain working on sprocket wheels, and there may be a third wheel in between to take up any slack in the chain; this wheel has no other function.

To set the valves in such an engine, proceed as described above, and having placed the crank in its correct position, take off the chain before turning the cam-shaft. When the inlet valve is beginning to open, replace the chain, taking care not to move either the crank-shaft or the cam-shaft during the operation.

It is perhaps worth remembering that the inlet valve should commence to open immediately after the exhaust valve has closed, and both these points should occur when the piston is practically at the top of its stroke.

Ignition Timing.—This is more likely to give trouble than the valve timing, and, moreover, it is sometimes found that a little alteration in the timing of the ignition may be of advantage, giving more power and better running of the engine.

The drive for the armature spindle in the magneto (*q.v.*) is either obtained from the engine-shaft or the cam-shaft through a chain or toothed wheels.

To ascertain if the "timing" is correct, turn the crank-shaft until No. 1 cylinder crank is on its top dead centre at the end of the *compression* stroke. The carbon brush in the distributor should then be in contact with the metal segment which is connected up to the plug in that cylinder, and the "make" and "break" points in the contact breaker should be just about to separate with the ignition control lever at half-retard.

If the timing is found to be incorrect, set the ignition control lever at half-retard, and place No. 1 cylinder crank in the position given above. Then disconnect the drive to the magneto, and revolve the armature spindle—in the direction indicated on the magneto—until the "make" and "break" are just separating. Connect up the magneto drive, either chain or spur gears, taking care that nothing is displaced during the operation, and the timing should be in order.

Back-firing.—If an engine back-fires continuously when first started and afterwards, the wiring should be examined, also the ignition timing, which may be out of order; the high tension wires may have been connected to the wrong plugs.

When an engine has been running smoothly for some time, and *suddenly* starts to back-fire through the carburetter, it is possible that the magneto drive has slipped.

Back-firing is sometimes caused by a weak mixture, but this does not often occur.

Also leaking or stuck inlet valves or a leak in the induction pipe from the carburetter may account for back-firing.

ENGINE TROUBLES, AND TO WHAT THEY MAY BE DUE.

Loss of Power.—Ignition too much retarded. Wiring at fault. Dirty plugs. Contact breaker points worn or out of adjustment. Carbon brush in contact with "slip-ring," or the "distributor" brush may be dirty. Incorrect mixture of fuel and air. Air leaks into pipe between carburetter and engine

cylinders. Insufficient or defective lubrication, resulting in increased friction. Poor compression, which may be due to valves not seating properly through wear or incorrect adjustment; worn, stuck, or broken piston rings; cylinder walls worn or scored; leaks at cylinder head joints or at sparking-plugs. (The latter leaks may be detected by smearing thick oil over the joints; bubbles will be formed in the oil if there are any leaks).

Misfiring.—Dirt on the brush or on the metal contact plates in the distributor. Contact breaker points dirty or worn. Contact breaker lever partially held up through its pin sticking in the insulated bush. Plugs dirty; insulation cracked; sparking points too wide apart; insulation of the high-tension wiring to plugs broken down. Incorrect mixture. Valves out of order or sticking. Water in fuel.

Knocking.—Ignition too far advanced. Carbonaceous matter in cylinders, due to the mixture being too rich, or over-lubrication. Cylinders hot through running the engine too long with the ignition retarded. Loose or worn connecting-rod or crankshaft bearings.

Back-firing to Carburetter.—Ignition wiring or timing wrong. Too weak a mixture. Inlet valve sticking or leaking.

Cylinders Overheating.—Ignition retarded too much. Poor water circulation through the jackets, or the fan behind the radiator may be out of action. Lack of lubrication. Thick carbon deposits in the cylinder heads.

Engine stops.—If gradually, the trouble is caused by a deficiency in the supply of fuel to the engine; the fuel tank may be empty; the fuel tap closed; the supply pipe to the carburetter choked or air-locked; or foreign matter is blocking the orifice of the jet. When a stoppage occurs through lack of fuel the engine usually back-fires into the carburetter before stopping.

If the engine stops suddenly and the tractor gradually, the trouble is invariably due to some defect in the ignition system.

A sudden stop of both engine and tractor indicates a mechanical breakdown, such as a seized bearing, broken connecting-rod, or some other equally vital part.

Engine won't stop.—Defect in the ignition system: it is possible that the wire between the magneto and the switch is disconnected, and has become short-circuited to the engine frame. Carbon in the cylinders: this will bring about ignition of the charge although the current from the magneto is switched off. To stop the engine, the fuel supply must be shut off.

The above represent the usual and more commonly occurring troubles and defects met with in the ordinary working of an engine of the type under consideration, and little difficulty should be experienced in diagnosing the source of the

trouble if the foregoing description has been carefully followed and understood. Once the trouble is located, the remedy to be adopted in order to effect a cure is usually a comparatively simple matter.

FUELS.

Benzol.—The use of petrol, benzol, and paraffin as a source of motive power in an internal combustion engine was referred to in the earlier portion of this article, and it is now desirable to give a few particulars with regard to benzol.

Benzol is a distillate of coal-tar, obtained in the manufacture of coal-gas, or coke for metallurgical purposes, and it forms an exceedingly valuable fuel for motive-power purposes.

The density of benzol is about 0.88, as compared with about 0.72 for petrol, consequently their respective weights per gallon are 8.8 lb. and 7.2 lb.

Although the heat value of benzol per pound is less than petrol, the value per gallon is about 16 per cent greater than the value for petrol; this is accounted for by the difference in the weight per gallon of the two fuels.

The safe compression pressure in an engine using petrol is from 70 lb. to 90 lb. per square inch, depending upon the composition of the fuel; whereas a charge of benzol vapour and air may be compressed to a pressure of from 150 to 180 lb. per square inch without spontaneous ignition taking place; consequently a higher efficiency and more power can be obtained from an engine specially designed to use benzol than can be developed in a petrol engine of the same size and speed.

Benzol can be used with any good carburetter without alteration, but much better results could be obtained if the carburetter was designed to suit the fuel.

For an engine to use benzol to the best advantage, the ratio of the stroke-bore volume to the compression volume should be greater than is possible to adopt in a petrol engine.

Since the rate of flow of benzol through a jet is somewhat less than for petrol, it may be found advisable, when using benzol, to put in a slightly larger jet, but this is a matter that can be easily ascertained by actual experiment.

A mixture of petrol and benzol in equal proportions forms a very suitable fuel for tractor and similar engines.

Petrol-Paraffin Engines.—In quite a large number of tractors the engines are designed to start up on petrol. After running for a short time the petrol is switched off, and the engine then works with paraffin.

It has been explained that paraffin requires heat to convert it into vapour, and in engines of the above type the exhaust

gases from the petrol combustion are used to heat up the paraffin vaporiser. As soon as the latter is brought to a sufficiently high temperature the paraffin can be turned on, and the engine will work satisfactorily and economically, since paraffin is cheaper than petrol.

At the same time, it must be borne in mind that the power obtained from an engine using paraffin is about 80 per cent of the power developed by the same engine working on petrol.

While paraffin is without doubt an economical fuel, it has certain disadvantages, largely in connection with the question of efficient lubrication.

Many engines are lubricated on what is usually termed the "splash" system, in which a fairly large volume of oil is maintained in the crank chamber, and during the working of the engine the oil is thrown about the interior of the engine-casing by the action of the moving parts, and finds its way to all parts requiring lubrication.

When using paraffin as a fuel it is extremely probable that some of the unvaporised paraffin will pass the engine piston and mix with the oil in the crank-chamber. Paraffin has a very deleterious effect on the lubricating properties of oil, which in course of time will be of very little value as a lubricant.

Lubricating oil is somewhat expensive, and many tractor owners have found from experience that it is more economical to run their engines on petrol rather than paraffin, the saving effected in the cost of the lubricating oil compensating them for the extra cost of the petrol; moreover, the engine gives less trouble and develops more power.

The above drawback to the use of paraffin does not apply if the engine is fitted with a "forced-feed" system of lubrication, in which a limited quantity of oil is delivered under pressure from a pump at definite intervals to all parts requiring lubrication.

LUBRICATION.

As mentioned above, two systems of lubrication, "splash" and "forced-feed," are in general use for conveying oil to the working parts of an engine. The latter system is preferable, as the quantity of oil used is under control, and is reduced to a minimum; further, it is forced under pressure to all the working parts, thus insuring proper and sufficient lubrication. It adds a little to the initial cost of the engine, but the reduction in oil consumption effected compensates for the additional outlay.

Lubrication is all-important in the care and upkeep of a tractor, or, in fact, any machine. To keep a machine in good condition it is absolutely essential that proper lubrication should be maintained at all parts having relative movement.

The object of a lubricant is to reduce friction, thereby increasing the mechanical efficiency of the machine, and at the same time prolonging its period of usefulness. As a rule, far too little attention is given to this important matter, and in consequence the cost of upkeep—due to avoidable wear and tear—is considerably increased.

When lubricating any parts to which dust and grit may have access, care must be taken that nothing of that nature is carried to the working parts by the oil. Grit is an excellent abrasive, and will soon have a very serious effect on those parts with which it comes into contact.

All apertures through which oil or grease is introduced should be kept covered to prevent grit entering, and before putting in oil it is advisable to wipe off any dust, &c., that may have collected round about the oil-hole. A little extra trouble in this direction pays in the end: the machine runs smoother, and the life of its working parts is prolonged.

Considerable care should be exercised in the selection of a suitable lubricant, and in this respect it is wise to be guided by the makers of the machine. A cheap oil may be the dearest in the long-run, and it is false economy to grudge paying a little more for an oil that will give efficient service. The same oil will not serve for all parts of a machine; some parts require a heavier oil than others. Further, an oil that is quite satisfactory in cold weather may not be so suitable in the warmer months. Heat thins an oil, and in this condition it is liable to be squeezed out from the bearings, resulting in defective lubrication.

An oil that is to be used for cylinder lubrication should have a fairly high "flash-point" (*q.v.*); otherwise it may cause pre-ignition should it get above the piston in any quantity. The writer has had experience with an engine that gave serious trouble through using an unsuitable oil.

Grease for the transmission should be semi-fluid in character; the gears cut tracks in hard grease, and further lubrication is impossible.

Run a new tractor with caution; want of care in this respect may do a considerable amount of harm to the working parts, which take time to bed together properly.

Do not lose sight of the fact that the life of the tractor, or any machine, depends upon the proper lubrication of all the parts, and remember that the lubricating should be done often and at regular intervals, not spasmodically.

CARE AND MANAGEMENT.

The man who is called upon to manipulate a tractor with any degree of success should make himself thoroughly ac-

quainted with the function of every part of the machine, and he must always have in mind that he has under his charge a somewhat complicated piece of mechanism that requires the best of care and strict attention to detail. Few people realise what a wonderful piece of machinery is represented by the engine of a tractor. Take a four-cylinder engine running at a speed of 1000 revolutions per minute, which is quite common. The cycle of operations whereby the charge is drawn into each cylinder, compressed, fired, and exhausted is repeated 2000 times in each minute. Is it not reasonable to demand that such a machine should receive sympathetic consideration ?

The sound or note produced by an engine when working affords a valuable guide to a skilled operator, who can tell thereby when adjustments are required in connection with the ignition, fuel supply, &c.

All the various working parts should receive examination each day when the tractor is in service in order to secure efficient performance with the smallest possible consumption of fuel and the least burden upon the engine.

Skilful and careful management means less wear and tear, and fewer breakages.

The engine and all working parts must be kept as clean as possible. Unfortunately the conditions under which tractors work are not conducive to a high state of cleanliness, but much may be done in this direction. The more vital parts should be provided with dust-proof covers, and those that are unavoidably exposed must receive careful attention whenever time and opportunity permit.

A suitable building should be provided for housing a tractor, and if left out on the land overnight it must be protected by covering it entirely with a good tarpaulin sheet. The whole of the ignition system may be put out of action by an accumulation of moisture on the magneto, &c.

It is also desirable to provide accommodation and the necessary equipment for carrying out minor repairs.

WORKING HINTS.

Before beginning the day's work, see that the fuel-tank is filled up, oil-reservoir replenished, and sufficient water in the radiator; also make sure that all lubricators are charged with oil or grease.

The air and fuel filters should be taken out and cleaned.

Examine carefully all parts of the engine and transmission—wiring, terminals, throttle and ignition controls, gear-levers, clutch, brake, steering, &c.; also make sure that no nuts are slack.

Starting the Engine.—Be certain that the gear-lever is in neutral position. Next prime the cylinders by injecting a little petrol—not too much—through the taps provided for the purpose in the cylinder heads. Turn on the petrol and put the ignition control lever at full retard. Turn on the switch, and start the engine by turning the starting handle, which must be pulled upwards, so that in the event of a back-fire no harm will be done to the operator. If all the parts of the engine are in proper adjustment, it should start easily, when the ignition can be advanced, and the engine allowed to run for a short time to get thoroughly warm before moving away.

Clutch.—The frictional force acting between the surfaces of the two members of the clutch must be sufficient to prevent slipping when they are in engagement, and they must not take hold too suddenly.

If, when the tractor is working, the clutch slips, it is usually on account of insufficient spring tension, and this may be remedied by tightening the clutch-adjusting nut, which, if too tight, may cause the clutch to grip.

Do not allow the clutch to engage too suddenly, which will set up severe strains on the transmission. The clutch should be let in quietly, with a certain amount of slip, until the machine is on the move, when it may be permitted to engage completely.

Gears.—Most tractors are provided with gears, which are designed for two or three speeds forward and a reverse.

For heavy work it is advisable to run on low gear, the higher speeds being more suitable for lighter work and for road haulage. When changing from low gear to second gear, first declutch and bring the gear-lever into neutral position, pausing there for a moment or two, and then move the lever into second-speed position, allow the clutch to engage, and open the throttle. For quiet gear changing the peripheral speed of the two wheels when about to be put into mesh should be as nearly as possible the same. Only practice in driving will acquaint the operator with the necessary speed required to change from one gear ratio to another.

To stop the tractor the throttle should be closed, the clutch released, and, if necessary, the brakes applied—all the above operations being performed as near to each other as possible.

Should the implement when ploughing be stopped suddenly by coming into contact with some hidden obstruction, *instantly put out the clutch*, otherwise there is a danger of the tractor rearing and falling over backwards, which may result in a very serious accident. An automatic safety-slip coupling, inserted between the tractor and the implement, may prevent an accident of this kind, but the most satisfactory method is to declutch the moment an abnormal resistance is felt.

Precautions in Cold Weather.—It is sometimes found in very cold weather, with everything in order, that the engine refuses to start, due to the petrol not being able to enter the cylinder in a vaporised condition, owing to the chilling action of the cold pipes, &c.

A simple method to overcome this trouble is to drain the water from the cooling system, and fill up the radiator with boiling water. Another method is to apply hot cloths to the carburetter and the induction pipe.

To ensure easy starting at any time, a good plan is to partially block the main air inlet into the carburetter by holding a handkerchief or cloth in front of it. As soon as the engine starts the cloth must be taken away immediately.

During very cold weather every drop of water in the cooling system should be drained off as soon as the tractor has completed its day's work, and it is also advisable to run the engine for two or three minutes afterwards, so as to boil off the last traces of water from the jackets. If the water freezes, there is every possibility that the jackets may crack and the radiator be damaged, necessitating a costly repair. Always fill up the radiator with *clean* and *pure* water, which should be passed through a strainer while being poured into the radiator.

Overhauling.—At the end of a season's work it may be desirable to give the tractor an overhaul for the purpose of cleaning it thoroughly, and making minor adjustments to take up ordinary wear and tear.

It is beyond the scope of this article to deal with the question of repairs in general, which should only be carried out by some one with a certain amount of practical mechanical skill, otherwise serious damage may be done. There is, however, no reason why any person possessing an elementary knowledge of machinery should not dismantle a tractor for cleaning purposes.

Before commencing to take the tractor to pieces—and only sections of it should be dealt with at a time—be careful to mark those parts that work together, in order that there may be no possibility of making wrong connections when assembling. As the several parts are taken asunder they should be placed, along with their accompanying nuts, &c., in a suitable box, so that nothing may be lost or covered with dirt.

CONCLUSION.

In the foregoing article an attempt has been made to give as clear a description as possible of the principle of action, working, and management of an internal combustion engine as adapted for agricultural or other kind of work. Once the general principle underlying the efficient working

of such an engine is thoroughly understood, there should be no difficulty in arriving at a reason for such troubles as may occur from time to time. If the trouble is known and the cause of it, the necessary remedy is obvious in most cases. Special attention has been given to the cases in which the remedy is not quite so obvious.

It is exceedingly difficult to deal satisfactorily with a subject of such importance within the somewhat narrow limits of an article. Very much more could be written with advantage, but in that case the article would develop into a text-book, and the object in view would be lost. In conclusion, the writer wishes to impress upon owners and operators of tractors, &c., the necessity for making themselves thoroughly familiar with the working and management of the machine, which is a good and capable servant, provided it receives intelligent and sympathetic consideration.

FERTILISERS BEFORE AND AFTER THE WAR.

By PROFESSOR JAMES HENDRICK, B.Sc., University of Aberdeen.

DURING the present century great changes have taken place in the fertiliser industry. It has been customary recently to speak of the war as having caused certain great expansions and developments in the use of fertilisers, but this is true only to a very limited extent, especially if we regard the world industry, and not merely the British industry, in fertilisers. Looked at from the wider point of view, the great expansion took place during the years before the war, and the real effects of the war have been to restrict the use of fertilisers in many directions and to alter some of the channels in which the industry flows by blocking up or restricting some of the sources of materials, and by greatly developing others owing to the action of certain urgent war needs.

FERTILISERS IN THE NINETEENTH CENTURY.

The fertiliser industry may be said to have originated about 1840. The only concentrated manure which was used to any large extent, and which formed an article of international commerce before that date, was bones. During the period which followed 1840 Peruvian guano was by far the most important concentrated manure, and its popularity helped much in educating farmers to use and have confidence in concentrated manures. During the same period, which we may call the guano period, other leading fertilisers were gradually coming into use, and by the end of the period, which may be placed about 1875, when the chief supplies of Peruvian guano began to be exhausted, nitrate of soda and superphosphate were already being used to a considerable extent, while sulphate of ammonia and German potash manures were also coming into use. Up to this time Britain was the chief home of the fertiliser industry, and the country in which most concentrated manure was used.

During the next period, which covered the last quarter of the nineteenth century, guano was steadily losing its important place, and falling to the comparatively unimportant position which it now occupies, while the use of

the leading manures which supply a single fertilising constituent—nitrogen, phosphoric acid, or potash—was increasing rapidly, and at the same time Britain was steadily losing its pre-eminent position in the fertiliser markets of the world, while other countries, like Germany, France, Italy, Belgium, Holland, and later the United States, rapidly increased their consumption of fertilisers and their trade in them. It was during this period that the fertiliser industry grew into an international industry of first-class importance, and that questions of the security of fertiliser supplies began to be looked upon by the leading civilised nations as important national questions. In this period also the United States, which had previously depended upon the natural fertility of its virgin soils, began to assume importance, not only as a producer but also as a consumer of fertilisers.

During the first five years of the period, 1875 to 1879, the average export of nitrate of soda from Chile was about 243,000 tons, of which about 100,000 tons annually came to Britain; while during the last five years, 1895 to 1899, the average export of nitrate from Chile had risen to 1,206,000 tons, of which the British annual consumption was still not much over 100,000 tons.

This rapid increase in the consumption of nitrate caused a certain amount of alarm lest the supplies should not be able to keep pace with the demand, and fears arose that the world's supplies would soon become exhausted, as had already been the case with Peruvian guano, and that the rapidly-increasing population of the world would, in consequence, be unable to obtain sufficient supplies of food. Serious attempts began to be made, therefore, towards the end of the period, to find means of utilising the practically unlimited supplies of free nitrogen which exist in the air in order to form artificial nitrates or other nitrogen compounds suitable for use as fertilisers. These have led to results of the most extraordinary kind during the present century.

Increases in production and consumption, comparable with those of nitrate of soda, took place during this period in the case of other leading fertilisers. In the United Kingdom the total production of sulphate of ammonia in 1875 was 46,000 tons. There are no available figures for the world's production at the same date, but it was probably far short of 100,000 tons. By 1900 the production in the United Kingdom alone was 213,000 tons, and the world's production was estimated at about 450,000 tons. Britain during this period developed an international trade in sulphate of ammonia, and by 1900 was exporting by far the larger part of what she produced.

The development in the case of phosphatic manures was somewhat similar. Accurate statistical information is not

available as to the world's production and consumption of mineral phosphates, nor of the production from them of superphosphate before 1900, but it was during the period we are considering that the great deposits in Florida and North Africa—from which the world has in recent times obtained far more phosphate than from any other sources—were opened up. Such information as we possess shows that at the beginning of the period the annual production of mineral phosphates was a few hundred thousand tons, while at the end it was almost 2 million tons, most of which came from the United States and North Africa.

The basic slag industry originated about 1880. The world's production had increased to almost $1\frac{1}{2}$ million tons by 1900.

The production of German potash salts began about 1860, and by 1875 almost 500,000 tons of crude salts were mined annually. This had increased to over 3 million tons by 1900, and formed by far the greatest source of potash compounds for use as fertilisers and for other purposes. Not only so, but during the earlier part of the period most of the potash salts produced were used in industries other than agriculture, while by 1900 over three-fourths of the production was consumed in the world's fertiliser industry.

THE PERIOD FROM 1900 TO 1914.

Great as had been the expansion of the fertiliser industry during the last quarter of the nineteenth century, the progress during the fourteen years before the outbreak of the Great War was greater still. The production of fertilisers had grown to an important international industry by 1900, but during the period 1900 to 1914 it became the most important of all the world's chemical industries. So much has been written about the importance of the chemical industries in dyes and drugs and their great development, especially in Germany, that we are apt to think that these are the greatest chemical industries. This is not the case. Important as these industries are, they are confined to very limited areas, while the fertiliser industry is almost world-wide, and its factories are to be found in nearly every town of any importance all over the civilised world.

While the dye and fine chemical industry employs a large number of chemists and other highly-skilled persons, it does not give employment to more than a small fraction of the labour which is required in the fertiliser industry, nor does it require anything approaching the same amount of shipping and other transport.

It has been said that the chemical importance of a country is to be measured by its consumption of sulphuric acid. If

so, its chemical importance is measured by its fertiliser industry, for, apart from the special consumption which arises for munitions during war, the consumption of sulphuric acid in the manufacture of the fertilisers superphosphate and sulphate of ammonia far exceeds all its other uses put together.

Even in the employment of highly-skilled technicians the fertiliser industry bids fair to rival the dye industry in the future, for the manufacture of synthetic nitrogen compounds, which is now growing to such great proportions, demands supervision by a large staff of the most highly skilled chemists, electricians, engineers, and other experts.

It is further to be remembered that while the consumption of dyes and fine chemicals is necessarily restricted within somewhat narrow limits, we cannot at present set any limit to the future consumption of fertilisers. Great as has been the expansion of the fertiliser industry during the past fifty years, it is only on a very limited part of the world's agricultural area that chemical fertilisers are yet used. In the United States the consumption is confined mainly to a few of the eastern and middle western states; while in Canada, with its enormous agricultural area, there is, as yet, very little fertiliser used. In the great agricultural countries of South America there are other potential fertiliser markets awaiting development. A similar tale is to be told of the immense agricultural areas of Russia and Asia. In Asia, Japan is as yet the only country which consumes fertilisers in quantities at all proportional to its population and its agricultural area.

The great importance of developing this industry from the widest point of view seems in recent times to have been better realised in Germany than in any other country. Britain was the pioneer in developing an international fertiliser industry, and took the leading part in exploiting the guano of Peru, and later in developing the nitrate industry and the by-product sulphate of ammonia industry; but in recent times our people seem to have lost their grip of the world-wide importance and magnitude of this industry, and of the great opportunities it presents for extending the industry and commerce of the country. It was the great group of dye manufacturers in Germany who deliberately set themselves from the very beginning of this century to employ the highest skill and to spend money freely in solving the problem of the commercial fixation of nitrogen, in the belief that if they succeeded they would be able to build up a great and profitable industry of world-wide importance.

The rapidity with which the consumption of fertilisers increased in the early years of the present century can readily be illustrated by a few figures. The export of nitrate of

soda from Chile was in 1913 almost exactly double what it was in 1900, while at the same time the world's production of sulphate of ammonia increased from about 450,000 tons in 1900 to about 1,400,000 tons in 1913. During the same period the new synthetic nitrogenous manures, calcium cyanamide (nitrolim), of which 156,000 tons were produced in 1913, and nitrate of lime, of which 73,000 tons were produced in the same year, began to come upon the market in quantity. While it is not maintained that any of these substances is used only as a fertiliser, for all of them have other uses, the fertiliser market forms by far the most important outlet for all of them in peace time, and all other uses to which they are put are unimportant in comparison with their use as fertilisers.

The production of rock phosphates was about 2 million tons in 1900, by 1913 it had increased to about 7 million tons, and as most of the rock phosphate produced is used for making superphosphate, the production of superphosphate increased correspondingly, and in 1913 the world's production of superphosphate was estimated at 11 million tons. Sulphuric acid is necessary for the manufacture of superphosphate, and consequently the manufacture of this acid, which forms one of the principal heavy chemical industries, increased rapidly also, and this led in turn to greatly-increased commerce in pyrites, sulphur, and other materials capable of yielding the sulphur requisite for the manufacture of sulphuric acid.

THE FERTILISER INDUSTRY AND WAR.

The connection between the dye and fine chemical industries and preparation for war has been repeatedly pointed out since 1914, and we have been urged to foster these industries in this country, since in time of war the factories and skilled scientific staffs necessary for the production of dyes and fine chemicals can be readily utilised for the production of munitions. The equally important connection between the fertiliser industries and the production of munitions does not appear to have attracted the same amount of attention. The most important materials for the production of munitions are sulphuric acid, nitrates, and ammonium compounds. The extension of the fertiliser industry had caused the production of these to be enormously increased before 1914, and but for this great growth in the production and consumption of manures the belligerent countries would have been unable to supply themselves with the enormous quantities of explosives required after the outbreak of war without improvising enormous factories for the production of

sulphuric acid, and devising means of greatly increasing their supplies of nitrates and ammonium compounds. Had the nitrate mines in Chile and the transport to carry the nitrate to Europe and the United States not been developed before the outbreak of war, it would have been very difficult, if not impossible, suddenly to expand them to war requirements after war was upon us, and similarly with the industry in ammonium compounds. In the case of Germany means had been devised before she went to war for producing nitrates and ammonium compounds synthetically in the country, otherwise she could not have carried on the war as she did. But these synthetic industries were developed primarily for fertiliser purposes, and not for the manufacture of war materials, though, no doubt, the fact that her chemical manufacturers had with great skill and labour devised means of making nitrates and ammonia synthetically was a factor in causing Germany's war chiefs to decide that the time had come when they might plunge the world into war.

It is not alone by enabling a country to produce more food that the fertiliser industry is of importance in providing strength in time of war; it is equally important in providing the materials and skilled personnel for making munitions. In this respect it is not of less importance than the synthetic dye industry to which such importance has recently been ascribed.

THE WAR PERIOD.

During the war the fertiliser industry necessarily underwent great changes. Although the importance of maintaining a supply of fertilisers in order to maintain or increase the supply of home-grown food was fully realised, the supply of munitions had to take first place. Some time was required before the country's leaders, military and political, realised the enormous supplies of munitions which are necessary for modern war, and before the full effect of the demand for war material was felt on the fertiliser market. Before the war had been long in progress, however, the whole supply of nitrate was taken for munitions, and agriculture had to learn to do without it. The demand for sulphuric acid also rapidly increased, and though the means of production were also increased and many new acid plants were built and others were extended, the supplies for the manufacture of dissolved phosphates were gradually restricted, and farmers had to restrict their consumption of superphosphate, and to learn to use basic slag and other undissolved phosphates. Before the war nearly all our potash manures were obtained from Germany, and as, of course, the import ceased during

the war period, crops had to be grown with little or no potash fertiliser.

At the same time, while the fertiliser supply was altered and restricted, British farmers were urgently called upon to increase food production, and they succeeded in doing so to a very praiseworthy extent. During the process they have learned a number of lessons which will, no doubt, have permanent effects.

Before the war the consumption of sulphate of ammonia for agricultural purposes in Britain was comparatively small. In 1913 the United Kingdom produced 432,618 tons of sulphate of ammonia, but by far the greater part of this, 337,000 tons, was exported, and it is estimated that 60,000 tons only was used at home for fertiliser purposes. Britain was the only country in the world which exported large quantities of sulphate of ammonia. The chief home consumption of this substance was in the manufacture of mixed manures, and farmers generally used very little except indirectly as a constituent of the grain, grass, turnip, and other compound manures which they purchased. During the war they learned to use it directly as a top-dressing for grain, grass, and other crops instead of nitrate of soda, which had previously been chiefly used for this purpose. Consequently the home consumption of sulphate of ammonia increased very greatly, and was 404,500 tons in 1918, of which it is estimated that 234,000 tons were used for fertiliser purposes. In 1919 the consumption for fertiliser purposes was even greater, and was estimated at 269,000 tons.¹ This represents a far greater amount of nitrogen than was used by our farmers before the war in the forms of both nitrate of soda and sulphate of ammonia. The British farmer having learned during the war to use nitrogenous manures, and especially sulphate of ammonia, more freely than in the past, will probably not forget the lesson. In the near future we may have a much greater choice of nitrogenous fertilisers, and if the farmer will carry the lesson further, he will find it to his advantage to learn to substitute one for the other according as one or other is cheaper and better suited for his particular requirements.

One of the most important effects of the war, so far as the future of the fertiliser industry is concerned, has been that the development of the manufacture of compounds from the nitrogen of the air has been speeded up enormously. Before the war only Germany among the great Powers was taking any serious interest in this question, and in Britain it roused little if any interest except in limited scientific circles, and its importance, both in peace and in war, was quite unrealised

¹ 'Statistical Supplement to the Final Report of the Nitrogen Products Committee of the Ministry of Munitions,' by J. A. Harker, O.B.E., D.Sc., F.R.S., p. 13.

by political and commercial people. The war had not been long in progress before Great Britain, France, and the United States all awakened to the vital importance of this new industry which had been developed in Germany, and all began in haste to endeavour to find out what Germany had discovered through long years of scientific and industrial research. The war ended before any of them had accomplished anything in the way of large-scale manufacture, though all of them had made great progress in solving the scientific and technical problems involved, and had made a commencement in translating their knowledge into industrial practice. In Germany itself the necessities of the war caused the productive capacity of the new industry to develop at a rate which could never have been accomplished under ordinary commercial conditions. Whereas the maximum annual capacity of output of synthetic ammonia from the German factories has been estimated as equal to 35,000 tons of sulphate of ammonia in 1914, it was estimated as equal to 850,000 tons in 1918.

During the war the production of other synthetic nitrogenous manures, nitrate of lime in Norway, and calcium cyanamide (nitrolim) in various parts of the world, was also greatly increased. The processes for turning ammonia into nitric acid and nitrate of ammonia, and for obtaining ammonia from cyanamide, were also greatly extended,—and again the development took place chiefly in Germany.

The main interest to agriculture and the fertiliser industry of all this war progress in the manufacture of synthetic nitrogen compounds lies in the security it gives for the future supply of concentrated nitrogenous fertilisers in unlimited quantities and at a reasonable price. No matter how great the world's demand for nitrogenous fertilisers may become, it can now be met. There is no limit to the extent to which production can be increased. The great increase which has taken place in production in Germany, and the great amount of capital sunk in developing synthetic processes in other countries, make it certain that synthetic nitrogenous fertilisers will compete vigorously with natural nitrate of soda and by-product sulphate of ammonia produced from the old sources. It is quite possible that in the near future the fertiliser market will be overstocked with concentrated nitrogenous materials, and that prices will fall below pre-war level. The great fall which has recently taken place may be only the beginning, for with the restoration of free world commerce and with the development of great synthetic factories in countries other than Germany, there is bound to be severe competition between the different nitrogenous fertilisers which will try to find a market, and there will be so many different sources

of supply that it will not be so easy as it was for the nitrate of soda producers, to form a ring to keep up prices against the consumers.

The war changes were not confined to nitrogenous manures; they also affected phosphates and potash manures. The necessity for conserving the supplies of sulphuric acid for the manufacture of munitions, and, later, the difficulty of providing shipping for the import of the usual supplies of rock phosphates, caused increased attention to be given to basic slag. Even before the war the consumption of basic slag was rapidly increasing in Britain, but in spite of this, we exported up to the outbreak of war large quantities of the slag which we produced. Slag was never a really popular manure with the British farmer in pre-war times, in spite of the many experiments, such as those of Cockle Park, which demonstrated the excellent results which it gives on grass and other crops. Under the pressure of war conditions farmers learned to use as much slag as our steel industry was able to produce. It is tragic that, just as slag became popular in this country, changes in the steel industry caused not a diminution in the production of slag, but such an alteration for the worse in its quality, that most of the slag now produced in Britain is quite a different substance from the old basic slag with which the experiments were made upon which the reputation of this manure is based.

The case of potash manures was quite different: the war cut off the supplies. Between 1900 and 1913 the consumption of German potash manures increased rapidly in Britain as well as in the rest of the world. This was largely the result of the vigorous and enlightened propaganda carried on by the German Potash Syndicate. With the outbreak of war the supply of potash salts, with the exception of the comparatively small quantity prepared from kelp by certain factories in Scotland, was suddenly cut off. The small supply which was left was urgently needed for war purposes, and consequently the price soared to a level which placed potash practically out of the reach of agriculture. Both in this and other countries investigations of all likely sources of potash compounds were made, and, for a time, flue dust from the iron industry and potash compounds extracted from flue dust, were placed upon the market. Attempts were also made to improve and increase the extraction of potash from sea-weeds, and to extract potash from feldspars and other insoluble silicates which contain it. None of these, however, met with any large measure of success, and any manufacturing processes based on them appear to have died a natural death with the end of the war.

AFTER THE WAR.

The general effect of the war has been to increase the potential supplies of all the three great classes of fertilisers—nitrogenous, phosphatic, and potassic,—but, temporarily, to decrease the world's demand, and increase greatly the difficulties of international trade in these as in other commodities. For a short time after 1918, while war conditions still existed to a greater or less extent, fertilisers remained very dear; but it seems a reasonable prediction from the present condition of the world's markets and supplies that fertilisers will be plentiful and low in price until such great developments take place in the world's agriculture as to cause demand again to overtake supply, unless indeed some other great conflagration takes place to upset all calculations.

The farmer has now at his command greater supplies and a greater variety of fertilisers than ever before, and with greater variety comes the necessity for a higher level of technical knowledge, so that the many different articles which he now has at his disposal may be properly and economically used. When concentrated nitrogenous manures were practically confined to sulphate of ammonia and nitrate of soda the matter was comparatively simple, but in future there are likely to be at least half a dozen different concentrated nitrogenous manures placed in quantity on the world's markets, and greater knowledge of agricultural chemistry will be required for their proper use. The same will apply, if to a somewhat less degree, to phosphatic and potassic manures.

NITROGENOUS MANURES.

In pre-war days calcium cyanamide (nitrolim) and nitrate of lime were already upon the world's markets in moderate quantities; as a result of the war the supplies of these have been greatly increased. Cyanamide has certain obvious disadvantages, and though when properly used good results can be obtained with it, as has been shown in many field experiments, it has never been popular with farmers, and it is quite possible it may pass out of direct use as a fertiliser, though it is not unlikely that it will be able to maintain its position as an intermediate stage in the manufacture of other fertilisers, such as ammonium compounds and urea.

Over 100,000 tons of nitrate of lime are now produced annually by the Norwegian factories, and it has been abundantly proved that this is a very valuable fertiliser. It does not seem likely, however, that its production by the pro-

cesses at present in use will increase very greatly in the future, for it is only in a country like Norway, in which electric power can be very cheaply produced, and where there are no other great outlets for the power, that it can be economically manufactured. The process of manufacture consumes a great deal of power, and in countries like Britain, Germany, and the United States, where power is much more expensive, other processes, such as the synthetic ammonia process which consumes far less power per unit of nitrogen fixed, have been deliberately adopted in preference to the Norwegian process. Even in Norway itself it may in time be found more economical to produce, despite cheap electric power, some other product, such as nitrate of ammonia.

The synthetic process for fixing nitrogen which seems likely to undergo by far the greatest development, is that for producing ammonia by the direct combination of nitrogen and hydrogen. It has been officially reported that Germany's capacity for fixing nitrogen in the form of synthetic ammonia was in 1920 about 300,000 tons, which, if all turned into sulphate of ammonia of 95 per cent quality, would represent almost 1,500,000 tons of sulphate of ammonia, or more than the whole of the world's production of this fertiliser in 1913. It is not to be supposed that Germany has ever yet produced this great quantity of synthetic ammonia in any year, but that is the amount her factories are capable of producing if they worked to their full capacity for a year.

Great factories for producing ammonia from the nitrogen of the air by processes of a type similar to that in use in Germany are being constructed in this country, in France, and in the United States. When these are all completed the production of ammonia from all of them will be enormous. The production of by-product ammonia from gas works, coke ovens, iron works, shale works, &c., has also increased considerably since 1913, so that the world's total capacity for producing ammonia from all sources is now considerably more than double what it was in 1913, and is rapidly increasing.

Formerly all the ammonia used for fertiliser purposes was combined with sulphuric acid, and used as sulphate of ammonia. This is not likely to remain so any longer. Already, before the war, the oxidation of ammonia into nitric acid was taking place in Germany and Belgium, though the process had hardly passed beyond the experimental manufacturing stage. After the outbreak of war Germany rapidly developed the process, owing to her urgent need for nitric acid, and it has since been developed on a large scale in the United States, and also in France and Italy. The nitric acid so produced can in turn be combined with ammonia to give nitrate of ammonia, the manufacture of which was undertaken on a very large scale during the war,

not only in Germany, but also in this country and other belligerent countries, though the ammonia and nitric acid used were not necessarily prepared synthetically. The preparation of this substance has now become an established process of manufacture, and after the war the large stocks of nitrate of ammonia which were left were used mainly as nitrogenous fertilisers. Nitrate of ammonia forms a much more concentrated manure than either nitrate of soda or sulphate of ammonia, and experiments show that weight for weight of nitrogen it is of similar manurial value. It can now be manufactured in great quantities, and is likely to find a permanent place in the fertiliser market, where its great concentration will give it certain advantages, especially when carriage is a heavy item. It contains 35 per cent of nitrogen, as compared with 21·2 per cent in pure sulphate of ammonia.

In order to obtain ammonia in marketable condition as a fertiliser, it is not necessary to combine it with sulphuric acid or to turn it into nitrate of ammonia; it may equally well be combined with hydrochloric acid to form chloride of ammonia, provided the hydrochloric acid is cheap enough. This is now being done. Hydrochloric acid is produced in such bulk in certain processes of manufacture that there is not sufficient outlet for it, so a new market is being sought for it in the production of chloride of ammonia for use as a fertiliser. This salt is quite as suitable for the purpose as sulphate of ammonia, and has the advantage of being more concentrated, as it contains, when pure, 26·2 per cent of nitrogen.

Another concentrated nitrogenous manure which may possibly be placed upon the market in considerable quantity before many years have elapsed is urea. This substance is the chief nitrogenous constituent of the urine of mammals, and is consequently applied to the land in considerable quantity in the urine of grazing animals. In the case of house-fed stock it undergoes change to carbonate of ammonia and enriches the dung-heap in ammonia. Some of the great German producers of synthetic nitrogenous fertilisers are now experimenting with processes for the production of artificial urea. This substance should form a most valuable and concentrated fertiliser. It contains when pure 46·7 per cent of nitrogen, a larger proportion than is contained in any other nitrogenous fertiliser; even nitrate of ammonia does not contain so much, and urea has other advantages over nitrate of ammonia, since it is not explosive, and does not absorb moisture on exposure to the air.

The following table shows the percentage of nitrogen contained in each of the nitrogenous fertilisers mentioned above. The percentages are calculated both in the pure material and in material 95 per cent pure.

TABLE I.—PERCENTAGE OF NITROGEN IN CONCENTRATED FERTILISERS.

	Pure.	95 per cent Pure.
Nitrate of Soda	16·5	15·7
Sulphate of Ammonia . . .	21·2	20·1
Nitrate of Lime	14·0	13·3
Nitrate of Ammonia . . .	35·0	33·2
Chloride of Ammonia . . .	26·2	24·9
Urea	46·7	44·4
Calcium Cyanamide (Nitrolim)	35·0	33·2

Nitrate of soda and sulphate of ammonia of ordinary commercial quality used to be 95 per cent pure. In recent times sulphate of ammonia has generally been supplied of higher quality than 95 per cent. The ordinary commercial quality of nitrate of lime is also of about 95 per cent purity, though sometimes it is supplied of lower quality than this. On the other hand, the processes of manufacture used turn out "nitrolim" admixed with a large amount of impurity, and ordinary commercial samples contain only 13 to 18 per cent of nitrogen. There is not as yet any established commercial quality for nitrate of ammonia, chloride of ammonia, and urea, but it is probable that they will be produced of a high degree of purity.

In order to ascertain whether, as a matter of fact, those new and unfamiliar nitrogenous manures give results on field crops comparable with those obtained from well-known manures like sulphate of ammonia, numerous experiments have been and are now being carried out with them in various places. Table II. gives the results of field trials on oats and hay carried out in 1921 at Craibstone, the experimental farm of the North of Scotland College of Agriculture.

TABLE II.—FIELD EXPERIMENTS WITH NITROGENOUS MANURES.

Plot	NITROGENOUS MANURE. Per Acre.	OATS.		HAY. Cwts. per Acre.
		GRAIN. Bushels of 42 lb. per Acre.	STRAW. Cwts. per Acre.	
1	1½ cwt. Calcium Cyanamide (Nitrolim)	89·5	44·9	60·3
2	¾ " Chloride of Ammonia .	102·8	47·8	63·9
3	¾ " Nitrate of Ammonia .	101·9	54·2	61·4
4	No Manure	81·9	43·0	50·7
5	1 7/10 " Nitrate of Lime . .	93·3	44·2	67·1
6	No Nitrogen	83·8	44·0	60·0
7	1½ " Nitrate of Soda . .	97·1	49·3	66·4
8	1 " Sulphate of Ammonia .	93·3	49·0	64·3
9	¾ " Urea	95·2	47·1	65·2

All plots, except No. 4, were equally manured with superphosphate, 2 cwt. per acre, and potash manure salt, $1\frac{1}{2}$ cwt. per acre of which was given in the case of oats, and 1 cwt. per acre in the case of hay. The standard nitrogenous manuring was taken as 1 cwt. of sulphate of ammonia per acre, and all the other plots which received nitrogenous manures were given the same amount of nitrogen per acre as is contained in 1 cwt. of sulphate of ammonia, hence in the case of such a concentrated manure as urea, less than half a hundredweight per acre was sufficient.

As is well known, close agreement between different individual plots cannot be expected in field experiments, even when the plots receive quite the same manuring, since uncontrollable factors, such as differences in soil, produce variations in crop. Too great importance therefore must not be attributed to small differences between the crops obtained from different plots in these experiments.

The general result of the experiments is to show that the unfamiliar nitrogenous manures—nitrate of ammonia, chloride of ammonia, and urea—gave increases of crop similar to those given by the well-known sulphate of ammonia and nitrate of soda. The only manure which did distinctly worse than the others was "nitrolim." These plots were visited by large parties of farmers and others before they were harvested, and the effects of the new nitrogenous manures in increasing the crop were quite distinct on inspection, especially in the case of the oat crop.

PHOSPHATIC MANURES.

There are likely to be great changes in the phosphate industry. In the pre-war period superphosphate was supreme, and basic slag came second in the world's markets. There is no prospect of any shortage of phosphates in any period which we can foresee. Practically unlimited supplies of rock phosphates of good quality are known,¹ though unfortunately no deposits of commercial importance occur in the British Isles. New North African mines are at present being opened up in Morocco, and shortly before the war deposits in Egypt began to be worked. Much has been heard since the war also of the rich deposits which are found on Nauru and Ocean Islands, and other islands in the Pacific Ocean. The supply of rock phosphate can be increased to a very great extent if the demand increases.

To produce superphosphate, the materials required are rock phosphate and sulphuric acid. The supply of sulphuric

¹ See "The Growth of International Trade in Manures and Foods," 'Transactions,' 1917, pp. 18-20.

acid was greatly increased during the war for munition purposes. Towards the end of the war the Minister of Munitions, who then had control of fertilisers as well as munitions, appointed a strong committee to consider the position of the sulphuric acid and fertiliser industries as affected by the new acid plants which had been erected by the Ministry during the war. In their report, which was presented early in 1918, the committee recognised that after the war there was bound to be a great excess of sulphuric acid, and that it would not be possible to find a use for all of it. They further recognised that in peace times the only great outlet for sulphuric acid, which gave any possibility of such development as to be likely to utilise any considerable part of the excess, was the fertiliser industry, and in particular the manufacture of superphosphate. Their principal general recommendation was that "every possible step should be taken to extend the use of fertilisers." They made various recommendations as to methods for extending the use of fertilisers after the war, such as by propaganda of an educative kind, and by "cheap and adequate transport" for fertilisers, not only in this country but to all parts of the Empire and to allied and neutral countries. Little appears to have been done to carry out their recommendations.

The appointment and report of this Committee show that it was realised in official circles before the end of the war that after the war there would be no scarcity of sulphuric acid. It is not at all likely that supplies of superphosphate will in future be restricted by any lack of acid: on the contrary, there is such an excess of acid that the producers have every interest in extending the manufacture and use of this fertiliser so as to obtain an outlet for their acid. As both the materials required for its manufacture are abundant, superphosphate is likely to be produced in any quantity for which there is a demand, and to compete keenly with all other phosphatic manures. This is all to the good of the consumer, for, as in the case of nitrogenous manures, it is bound to cause prices to fall to the lowest figures at which profits can be made.

Superphosphate has the advantage over basic slag and all other phosphatic manures which can be obtained in great quantities, that it is soluble in water, and is therefore distributed in the soil by being washed in by the rain, whereas we have to depend on fineness of grinding in the case of insoluble phosphates like basic slag, and even then obtain much less perfect distribution. This advantage of superphosphate has been greatly overrated in the past, and insoluble phosphatic manures, with the exception of bones, have been much underrated. Superphosphate soon becomes insoluble in the soil, and soon loses its initial advantage. It is taking

an immense amount of experiment to convince both agricultural scientists and farmers that phosphates do not need to be soluble in water in order to give good results, and that rock phosphates do not require to be turned into superphosphate before they have value for fertilising purposes. It is assumed in the report of the Departmental Committee already referred to that an increase in the use of phosphates necessarily means an increased consumption of superphosphate.

Ground rock phosphates are very much cheaper per unit of phosphate than superphosphate, for a large part of the cost of superphosphate is the cost of the acid necessary to produce it. It has been argued that the advantage of solubility is so great that it more than makes up for the extra cost. This may be so in certain cases, but experimental results show that, at any rate in a great many cases, it is not so, and that therefore ground rock phosphates might be used with advantage to a very much greater extent than has hitherto been the case. Naturally it is not to the interest of the sulphuric acid producers to proclaim the merits of undissolved phosphate, and the acid makers are generally also makers of superphosphate—their business is to uphold the merits of the superphosphate which they make with their acid.

Table III. gives the average results of sixty-six experiments carried out on the turnip crop during the four years preceding the war in the counties in the north and north-east of Scotland.

TABLE III.—FIELD EXPERIMENTS WITH DIFFERENT PHOSPHATES.
TURNIP CROPS, 1911-14.

Average of Sixty-six Experiments in the Northern Counties of Scotland.

All Plots except No. 1 received Sulphate of Ammonia and 30 per cent Potash Salt, each at the rate of $\frac{1}{2}$ cwt. per acre.

Plot.	PHOSPHATIC MANURE	Ton	
1	None	13	17
2	Superphosphate	20	12
3	Basic Slag	20	0
4	Ground Mineral Phosphate (North African)	19	10
5	Steamed Bone Flour	20	7
6	Bone Meal	19	11
7	Dissolved Bones	20	3
8	Mixture of Superphosphate and Basic Slag.	20	15
9	Mixture of Superphosphate and Ground Mineral Phosphate	20	8
10	Mixture of Superphosphate and Steamed Bone Flour	20	15
11	Mixture of Superphosphate and Bone Meal.	20	11

Farmyard manure was applied to all plots at the rate of 12 tons per acre. An equivalent amount of phosphoric acid, 50 lb. per acre, was given to Plots 2 to 11. In Plots 8 to 11 one-third of the phosphoric acid was in the superphosphate, and two-thirds in the other phosphatic manure.

These experiments were made on a great variety of soils, and the average of so many different trials made under equal conditions of manuring during four different seasons gives a fair representation of what may be expected, in Scotland at any rate. They show that any phosphatic manure, whether superphosphate, basic slag, ground mineral phosphate, or bones, applied along with a moderate dressing of farmyard manure and some nitrogenous and potassic manure, will give on the average a large increase of crop as compared with land which received equal treatment in every other way, but no artificial manure. The difference between the worst of the phosphatic dressings and no phosphate is much greater than the difference between the best and the worst of the phosphatic manures. Superphosphate gives the best result of the individual phosphatic manures, but basic slag is only 12 cwt. per acre behind, and ground North African mineral phosphate, supplying an equal amount of phosphate, only 10 cwt. behind basic slag.

The Plots 8 to 11 are very instructive, for they show that when superphosphate is mixed with twice the amount of phosphoric acid in the form of an insoluble phosphate, the crop obtained is as great as if the whole of the phosphate were applied as superphosphate. This is true even in the cases of the most insoluble phosphates—ground North African and bone meal. It is to be remembered that the ground mineral phosphate is much the cheapest phosphate used in these experiments.

Similar results have been obtained during the past season in experiments in which Gafsa phosphate, a North African rock phosphate, and Belgian phosphates were tried in comparison with superphosphate and basic slag. Numerous experiments have also been made with crops other than turnips, and in all cases the results have taught the same lesson.

It is not only in the north-east of Scotland that such experiments have been made; they have been carried out in many districts and by many experimenters. The general result is to show that, on the average, ground mineral phosphates give results not much behind those given by an equal amount of phosphate in the form of superphosphate, and that, generally speaking, ground mineral phosphates, such as North African phosphates, give results, weight for weight of phosphate, almost equal to those given by high-grade basic slag.

Such results require to be made widely known. British

agriculture might save a great deal of money if ground mineral phosphate was used to a much greater extent than at present in place of more expensive phosphatic manures. In the depressed times which have now fallen on agriculture, it will be necessary to curtail expenses wherever possible; this might be done in the case of phosphatic manures by the more general use of ground mineral phosphates.

Much discussion has taken place in this country since the war on the question of basic slag, and how it is to be improved in quality and the supplies of it increased. For instance, the Faraday Society held a general discussion on the subject in March 1920, in which a number of leading agricultural chemists and other agricultural scientists, metallurgical chemists, steel experts, and others took part, and issued a full report of the proceedings.¹ Resulting from this discussion a distinguished Committee was appointed by the then Minister of Agriculture, Lord Lee, "to consider the development and improvement of the manufacture of basic slag and the extension of its use."

In the writer's opinion, the natural solution to the whole problem lies in the use of ground mineral phosphates, such as North African phosphates, which have proved themselves suitable for direct use as manure, and which are much cheaper, unit for unit of phosphate, than basic slag. It is gratifying to find that Lord Lee's Committee, in an interim report presented during last summer, while proposing inquiry into various methods for improving the phosphorus content of slag, also appear to approve of a proposal for experiments to discover "whether finely-ground mineral phosphates differ greatly in value from basic slag." No doubt they are aware of the many experiments which have already been carried out on the subject.

There was a popular belief at one time—no doubt it still persists at the present day—that the principal disadvantage of superphosphate is its acidity, and that this acidity is due to the presence of free sulphuric acid in the superphosphate. As is well known to chemists, the acidity cannot be got rid of without getting rid of the solubility, for the acidity is due to the water soluble phosphate, which is acid in reaction. Various devices were tried to cure this acidity, the most thorough of which was the addition of lime to form the so-called basic superphosphate, which was practically free from water soluble phosphate.

Other phosphatic manures were prepared from rock phosphates, either with the idea of obtaining a phosphate like basic slag, or in some other way rendering the mineral

¹ "Basic Slags: Their Production and Utilisation in Agriculture," Faraday Society, London, 1920.

phosphate more soluble without the use of sulphuric acid. These processes never had much vogue in this country, but were in use in certain continental countries like Belgium and Italy.

In this country certain phosphates, which are really camouflaged ground mineral phosphates, have been much pushed and advertised both before and since the war. Among the advantages claimed for them are their basic nature or freedom from acidity, and their availability to plants. In the case of one much-advertised article a special and most misleading test for solubility is proposed. In the long-run it would be much better for agriculture and the fertiliser industry, if not for the immediately interested individuals, that these manures should be openly put forward as what they really are—ground mineral phosphates. This would accustom the trade and agriculturists to the direct use as fertilisers of ground mineral phosphates, and help to teach them the real value and usefulness of such manures.

POTASH MANURES.

During the war farmers had practically to do without potash manures, and they had an excellent opportunity of discovering how much or how little their crops suffered from the lack of them. The extent to which potash manures are required more commonly depends upon the nature of the soil than is the case with either nitrogenous or phosphatic manures. Many soils are naturally so rich in potash that comparatively little special potassic manure is required, while, on the other hand, there are many soils on which full healthy crops cannot be grown without such manure. Between these extremes are all sorts of intermediate requirements.

Before the war all the potash mines were in the hands of the Germans, and the German Potash Syndicate controlled practically the whole of the world's supply of potash manures. As a result of the war the French have acquired an important potash-bearing region in Alsace, so there are now two great rival groups—the French and the German—and there will, in all probability, be severe competition between them. That will be to the benefit of the consumer. Already the price of potash manures has fallen from its prohibitive level during the war to a level not much above that which prevailed in pre-war days, and it seems unlikely that prices have yet reached their lowest level.

The Alsacian potash manures do not differ fundamentally from those to which agriculture was accustomed in pre-war days, though some new names, like "French Kainite" and

"Sylvinite," have been introduced, and the percentages of potash are not in all cases the same as those to which we were formerly accustomed. The crude salts from the French mines contain, generally speaking, a higher percentage of potash than those from the German mines, and French Kainite is advertised as containing 14 per cent of potash as compared with 12·4 per cent in the German.

The different potash manures are all more or less interchangeable, and, unit for unit of potash, do not differ greatly from one another in value. The question of price per unit should therefore be the main consideration for the farmer in settling which is to be chosen for any particular purpose. While occasionally a concentrated salt, like muriate of potash or sulphate of potash, may be preferred over a crude salt, like kainite or sylvinite, or *vice versa*, for some particular purpose, in general the price per unit of potash should be the important factor in settling the question.

During 1921 some field experiments were carried out at Craibstone on potatoes in order to test the comparative value of the different potash manures, French and German, now on the market. Seven different varieties of potatoes were included in the experiment—namely, Nithsdale, Majestic, Tinwald Perfection, Abundance, Ajax, Epicure, and British Queen—and the average results for the seven are given in Table IV.

TABLE IV.—TRIAL OF DIFFERENT POTASH MANURES ON POTATOES.

CRAIBSTONE EXPERIMENTAL FARM, 1921

Average of Seven different Varieties of Potatoes.

Plot.	POTASH MANURE. Per Acre	Average Crop per Acre.					
		Large		small		Total	
		Tons	Cwt	Tons	cwt	Tons	Cwt
1	None	5	9	0	18	6	7
2	2 cwt. Sulphate of Potash .	11	2	1	1	12	3
3	3·6 cwt. Sulphate of Potash Magnesia	11	1	1	6	12	7
4	None	6	15	1	7	8	2
5	1·9 cwt. Muriate of Potash .	11	7	1	4	12	11
6	3·8 cwt. Potash Manure Salt, 20 per cent (German)	11	11	1	8	12	19
7	6·6 cwt. Kainite (German) .	11	18	1	2	13	0
8	None	6	11	1	8	7	19
9	7·5 cwt. Kainite (French) .	11	11	0	16	12	7
10	4·9 cwt. Sylvinite (French) .	12	6	0	17	13	3

No dung was used. All plots, except No. 1, received sulphate of ammonia at the rate of 2 cwt. per acre, and superphosphate at the rate of 6 cwt. per acre. All the potash manures were used in such quantity as to give the same amount of potash as was given by 2 cwt. of sulphate of potash on Plot 2.

Craibstone soil is naturally well supplied with potash, and as a rule does not give any great return for the use of potash manures. In this case, however, the soil was in poor condition and much exhausted. It therefore gave in every case a good return for the use of potash manure. The crops on Plot 1, which received no manure, and on Plots 4 and 8, which received no potash manure, showed all the indications of potash starvation. Though the different varieties gave different crops, the early variety "Epicure" giving the smallest crop and "Majestic" the largest, all the varieties showed large increases from the use of any of the seven potash manures. On the average all the different manures gave very similar increases in crop, though the crude manures—French sylvinite and German kainite—did rather better than the others.

CONCLUSION.

Farmers have now at their disposal a greater variety of concentrated fertilisers than ever before. They therefore require to know more. In order to select wisely the fertilisers they are to use, and to use them economically, they need to know something of their nature and properties; more than ever, therefore, they require to have some knowledge of the chemistry of fertilisers.

It is probable that for some time to come the supply of the three chief classes of fertilisers—nitrogenous, phosphatic, and potassic—in the world's markets will be plentiful, and that there will be severe competition between different classes of producers. All classes of fertilisers are therefore likely to be cheap, so that even if the prices which the farmer gets for the produce which he has to sell are low, the prices of the fertilisers which he has to buy are likely to be at least as low in proportion. Now that depression has again set in the farmer should not give up or restrict the use of fertilisers, but should increase his use of them. The proper and liberal use of fertilisers always pays well, for a great increase of crop can usually be obtained by a small expenditure on manure, while all standing charges, like rent and labour, remain the same.

While, for a time, the producers of fertilisers are likely to suffer from over-production and consequent low prices, there is every reason to expect that as the world settles down the

fertiliser industry will again grow and develop as it did during the forty years before the war. One cannot at present place any limits on its possible expansion in the future, and the world may in time require, for instance, 70 million tons of rock phosphate per annum instead of the 7 million tons it consumed in 1913. The country which applies science and commercial enterprise to the industry will in the long-run secure the great place in the world's markets. Before the war Germany was shaping to become that country, and will likely do her best to recover her position.

ROTATION CROPPING.

ON A DEMONSTRATION AREA IN WIGTOWNSHIRE.

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IN the area served by the West of Scotland Agricultural College there are now several demonstration centres, which are commonly known as Demonstration Areas. These, as a rule, are somewhere about ten acres in extent, and in order that the fullest benefit may be obtained from the cropping carried out on them, the soil over the selected area must be uniform and also representative of much of that in the district or county.

These areas are not really intended to function so much in the sense of experimental centres as areas—

- (1) for testing, under local soil and climatic conditions, methods of cropping, manuring, &c., that have proved successful under other conditions, and confirming, or otherwise, the results obtained ; and
- (2) for demonstrating what improvement, if any, may be effected on the common practice of the district.

In this paper an account is given of the scheme of cropping that was adopted, and of the results obtained over a cycle of years on a Demonstration Area in Wigtownshire, situated near Castle Kennedy, on the farm of Mark, tenanted by Mr W. T. Ferguson. The area is rectangular in shape and exactly 10 acres in extent, being 150 yards broad and 322½ yards long. The surface is very level, and the area is located in the centre of a 40-acre field. There are numerous advantages in having an area so placed, and more reliable results can generally be obtained under such conditions.

The soil of the area under consideration is naturally poor and light, being of the nature of a sandy peat, but it is fairly representative of much of the poorer land in that locality.

Prior to being ploughed up in the winter of 1917-18, the field had been in grass for a period of five years, but the grazing was of very second-rate quality, more particularly in the years just prior to breaking up.

Occasionally in that district, when land is broken up, roots are taken immediately after grass. That practice was not adopted in this case, but it was decided to follow the more common rotation of oats, roots, oats, hay, and grass. Oats were accordingly sown on the area in the spring of 1918.

The varieties of oats most commonly grown in the district at that time were of the straw-producing type, such as Potato and Sandy. Dairying is extensively carried on, and special stress is put on the value of the straw for fodder purposes. Accordingly, in arranging the cropping for the first year, it was decided to include the Potato oat as representing that type, and to introduce three grain-producing varieties which had given excellent results in College trials in other districts, but which were very little grown in that neighbourhood.

The varieties selected, in addition to Potato, were Victory (a Svalof variety), Record (raised by Gartons Ltd., Warrington), and Beseler (a variety introduced from Germany by Principal Wright, now Sir R. P. Wright).

One quarter of the area was put under each variety, so that there were actually four $2\frac{1}{2}$ -acre sections, an entire section being sown with the seed of each variety of oat mentioned above.

Manuring of the oat crop is not very common in the district, and in order to demonstrate the actual benefits from manuring, it was arranged that a section of the area, 2 acres in extent, should receive no manure. The other 8 acres were divided into two equal sections of 4 acres, and one of these sections got a somewhat heavy dressing of manure and the other a medium dressing.

The scheme of manuring was arranged in such a way that, with each variety of oat, a half-acre plot received no manure, 1 acre got a dressing consisting of 3 cwt. superphosphate (30 per cent), 1 cwt. sulphate of ammonia, and $1\frac{1}{2}$ cwt. salt, and the other acre exactly two-thirds of these amounts—namely, 2 cwt. superphosphate, $\frac{2}{3}$ cwt. sulphate of ammonia, and 1 cwt. salt.

Owing to war conditions, potash was not available, and salt was included as a partial substitute. Had potash been available, the benefits from its inclusion would undoubtedly have been very great, as the soil was of a type on which potash manuring would have had marked effects.

The full scheme of cropping and manuring for season 1918 is indicated on the following plan :—

PLAN I.

SCHEME OF CROPPING AND MANURING IN SEASON 1918.

	3 cwt. Superphosphate. 1 cwt. Sulphate of Ammonia. 1½ cwt. Salt.	2 cwt. Superphosphate. ¾ cwt. Sulphate of Ammonia. 1 cwt. Salt.
NO MANURE.		

A	V	I	C T O R Y	
B	P	O	T A T O	
C	R	E	C O R D	
D	B	E	S E L E R	

Dark dotted = Heavily manured plot.

Light dotted = Medium manured plot.

The artificial manures were applied and harrowed in, and the oats were then drilled in. The rate of sowing the different varieties was, as nearly as possible, 3,000,000 seeds per acre. In the case of the Potato oat, 5 bushels, and with the other varieties approximately $6\frac{1}{2}$ bushels, were required to supply that number of seeds.

The crop came away quite well, and it was soon apparent that the manures were going to have a very marked effect on the yield, and as the season advanced this early promise was fully confirmed.

A public demonstration was held about ten days prior to harvesting, when the crops on the various sections were carefully inspected. There was general agreement that the crop on the more heavily-manured section was easily the best, and that on the unmanured section much the poorest, all the varieties on the latter section being thinner on the ground, showing that tillering had not taken place to anything like the same extent.

Of those who were present, ten prominent agriculturists in the neighbourhood made a very careful examination of the crops on the different sections, and handed in papers giving what they considered to be the probable yields per acre (grain only) likely to be obtained from the various sections. These estimates of yields were averaged, and are of interest as showing what was considered to be the difference in yield due to manuring. The averages were as follows :—

ESTIMATED YIELDS OF GRAIN.

Section.	Variety.	No Manure	Heavy Dressing.	Medium Dressing.
		Bushels.	Bushels.	Bushels.
A	Victory	46·2	66·1	60·3
B	Potato	42	55·5	51·4
C	Record	49·9	65·1	60·3
D	Reseler	49·5	68·5	62·6
Average of the estimated yields .		46·9	63·8	58·6
Estimated increase from manuring .		...	16·9	11·7

When the crop had been harvested and threshed, it was found that though the actual yields per acre differed from the estimates to some extent, yet the increases due to manuring had been wonderfully accurately estimated.

The actual yields per acre on the different sections were as follows:—

YIELDS OBTAINED PER ACRE.

Section.	Variety.	No Manure.		Heavy Manuring.		Medium Manuring.		Total yield from the 2½ acres.	
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
		Bush.	Cwt.	Bush.	Cwt.	Bush.	Cwt.	Bush.	Cwt.
A	Victory .	49	16½	70½	28½	70½	25½	165½	62½
B	Potato .	49½	22½	56½	28½	55½	26½	136½	66½
C	Record .	57½	23½	70½	29½	68½	26½	167½	67½
D	Beweler .	47½	19½	71½	26½	64½	23	159½	59½
Average yield per acre for all varieties .		51	20½	67½	28½	64½	25½	...	...
Increase from manuring . . . .		...	...	16½	7½	13½	5	...	...

The yields of grain given above are inclusive of "Seconds" as well as "Firsts," and therefore represent the total yield of grain; the figures are consequently rather higher than if Firsts only had been given. On the unmanured section the Seconds amounted to about 9 per cent of the total grain, or approximately 4½ bushels per acre, and on the manured section to 7½ per cent, or approximately 5 bushels per acre. There was little difference in the amounts from the different varieties.

It will be seen from the figures that fully the best yield on the manured plots was obtained from Victory. With this variety, the yield of grain on the more heavily-manured acre was exactly the same as that from the medium-manured acre; but this was due to a rather poorer crop on a small part of the more heavily-manured acre, which had suffered slightly from drought or some similar cause. From the appearance of the plots prior to harvesting the heavy-manured acre was easily the best, and but for the reason referred to, would in all probability have given at least 4 bushels more grain per acre than it did. This emphasizes the difficulty—which is a very real one—of getting 10 acres of land that are perfectly uniform.

It will be noticed that Record gave a very good yield all over, and that it proved much superior to the other varieties, even to Potato, on the unmanured section. That characteristic of Record—namely, adaptability to different conditions—has been noticeable in other experiments in which it was included, and is a very valuable one.

The yields from the Potato oat on both of the manured

sections emphasizes the fact that this variety is not capable of responding to manuring to the extent that many of the grain-producing varieties can do, more particularly when a fairly heavy dressing of manure is given; the yield without manure is, however, quite good, Record being the only variety that proved superior to Potato on the unmanured section.

The manuring did not only materially increase the yield, but at the prices prevailing for the produce of the 1918 crop it proved highly profitable, as there was a balance—after deducting the full cost of the manure—of 69s. 6d. per acre on the medium-manured section, and of 78s. 9d. on the more heavily-manured section. Accordingly, if the crop without manure was a profitable one, the manured crops were very much more profitable.

Values in 1918 were undoubtedly abnormally high, and the financial aspect can perhaps be better brought out by adopting the rates prevailing at the present time; but even at these rates, the value of the increased yield not only meets in full the cost of the manure, but leaves a very substantial balance.

VALUE OF INCREASE PER ACRE AND BALANCE AFTER
DEDUCTING FULL COST OF MANURE.

	Medium Dressing	Heavy Dressing
Average increase due to manuring	13½ bushels grain 5 cwt straw	16½ bushels grain. 7½ cwt straw
Value of increase at 3s. per bushel of grain and 2s per cwt. of straw	51s 6d	64s 3d.
Full cost of artificials at current rates	21s 0d	31s 6d.
Balance after deducting full cost of artificials	30s 6d	32s. 9d.

It is quite clear from the above that the application of artificial manure to the oat crop, under the conditions that prevailed on the Demonstration Area, proved highly profitable and very materially increased the yield. Further, the manuring did not bring with it any adverse results, as there was no lodging on any of the plots; the inclusion of the common salt in the absence of potash no doubt contributed somewhat to this highly desirable result.

Apart from effect on yield and on tillering already noted, the manures had quite a marked effect in some other directions.

They hastened ripening. The unmanured section was the last to ripen, there being a difference of several days; moreover, the crops on the unmanured plots did not ripen so uniformly, and that was no doubt partly responsible for the rather higher percentage of Seconds in the total yield of grain from that section.

The bushel weight of the grain on the manured sections was also much heavier than on the unmanured part, the actual figures being as follows :—

BUSHEL WEIGHT OF GRAIN ON THE DIFFERENT SECTIONS.

Variety of Oat.	No Manure.	Heavy Dressing.	Medium Dressing
	Bushel Weight.	Bushel Weight.	Bushel Weight
Victory	38½	41	41½
Potato .	39½	42½	41½
Record .	38½	40	39½
Beseler .	40	42½	41½
Average	39½	41½	41

In order to test the milling properties of the different varieties of oats, twenty bushels (800 lb.) of each variety—the produce of the heavily-manured section—were sent to a local mill to be made into meal. In some previous trials Victory and Beseler had been found to produce just as much meal per bushel as Potato oats, but in this case the best return in meal per bushel of oats was obtained from Potato. At the same time, although Potato oats gave about 1 lb. more meal per bushel than Beseler and Victory, yet the actual meal production per acre is very much in favour of these varieties, and that, after all, is the crucial test rather than the amount of meal per bushel.

The actual amounts of meal obtained from the 800 lb. of each variety of oats and the calculated meal production per acre from the heavily-manured sections were as follows :—

MEAL PRODUCTION FROM 800 LB. OATS AND CALCULATED YIELD OF MEAL PER ACRE.

Variety of Oat.	Meal produced from 800 lb. of Oats		Calculated Yield of Meal per Acre.	
	st	lb.	st	lb.
Potato	34	10	97	9
Beseler	33	4	118	9
Victory	33	3	117	0
Record	32	11½	116	0

Yield and Quality of Straw.—The yields already given show that there was comparatively little difference in the amounts of straw produced by the different varieties on the manured sections. On the whole, Record gave the largest yield, and Potato came next in order. On the unmanured section the differences were rather greater, but here also Record gave the largest yield, but Potato was very little behind. Beseler and Victory both gave considerably less straw per acre on the unmanured section, but the superiority of the other two varieties was very much less pronounced on the manured sections, more particularly on the heavily-manured part.

As regards quality of straw, that from Potato was certainly the finest when judged by the usual standards. A very careful watch, however, was kept when the straw from the different varieties was fed to the cattle; but, in so far as could be judged from mere observation, no preference was shown for the straw of any particular variety, and there did not appear to be any difference in feeding value.

As a result of the first season's cropping, the conclusions that one seems fully justified in arriving at are as follows:—

1. That very great benefits are to be derived from manuring lea oats on land of the type under consideration.
2. That the Potato oat is not the most suitable variety for such land, especially when artificial manures are applied, as some of the newer varieties respond very much better to manuring than Potato appears capable of doing.
3. That though Potato oats may give a slightly higher percentage of meal per bushel than some of the other varieties, it is very much less profitable than these varieties when meal production per acre on the more heavily-manured section is taken as the basis of comparison.
4. In so far as could be judged the straw from all the varieties was very similar in feeding value, and equally well relished by the stock.

The yield of oats in 1918 was, on account of the favourable season, well above the average, but it is of interest to compare the average yield per acre from the 8 acres on the Demonstration Area which were manured with the average yield for the county of Wigtown for that year.

According to figures kindly supplied by the Board of Agriculture for Scotland, the yield of oats for Wigtownshire in 1918 was *46.5 bushels per acre*. The average yield from the 8 acres on the Demonstration Area was almost 66 bushels. This figure, as previously pointed out, includes Seconds, which amounted to about 5 bushels per acre, but even when de-

ducted, the 8 acres still give $14\frac{1}{2}$ bushels (or 31 per cent) more per acre than the average for the whole county, and that on land decidedly under the average. The difference furnishes food for thought, but there is no reason why it should not be realised and furnish food for stock.

MANURING AND CROPPING IN SEASON 1919.

In 1919, the four sections of $2\frac{1}{2}$ acres each, already referred to, and marked A, B, C, D on the plan, were retained. Sections A and C received moderate dressings of farmyard manure in addition to artificials, but the other two sections, B and D, got nothing but artificials. The entire area received a dressing of ground limestone.

The application of farmyard manure to land for the root crop is not favoured in Wigtownshire, and application in the drill in particular is believed to encourage finger- and -toe disease. That method of applying the farmyard manure, however, had always given the best results in the experiments carried out at the College farm, and as one of the main functions of a Demonstration Area is to test the applicability of results obtained elsewhere to a particular district, that method of manuring was included in the scheme of manuring for 1919. The chief drawback to the method is the extra labour involved in the busy spring season.

The whole area was thoroughly cultivated in the late autumn, and this greatly lightened the amount of spring cultivation required. On Section C a dressing of farmyard manure at the rate of 14 tons per acre (20 level loads) was applied on the surface in early winter and ploughed in, the entire area being ploughed at that time.

In connection with the application of the farmyard manure, special care was taken by Mr Ferguson to see that the manure applied, as far as could be judged from appearance, was uniform in composition, and that it was evenly distributed over the $2\frac{1}{2}$ acres comprising Section C.

The ground limestone was applied early in spring at the rate of 1 ton per acre, and was harrowed in.

The artificial manures were not applied till the time of planting or seeding in spring, when they were put in the drill, and this applied to all the sections.

Section A got exactly the same amount of farmyard manure as had been applied to Section C, but this was put directly into the drill in spring, the same care being taken to see that the manure was uniform and evenly spread. The artificials used were the same as those for Section C, so that the only point of difference in the treatment of these two sections lay

in the fact that on one section the dung was applied on the surface in the early winter and ploughed in, and on the other it was applied in the drill in spring.

The other two sections, B and D, were utilised for a comparison of the relative values of basic slag and steamed bone flour as sources of phosphate. Bone manures are much favoured and are fairly extensively used in Wigtownshire, but in comparatively recent years basic slag has also been much in demand for certain purposes. The grade of slag procurable at the time contained only 20 per cent of phosphate, but was guaranteed as to fineness of grinding and citric solubility. The steamed bone flour supplied 60 per cent of phosphate in addition to 1 per cent of nitrogen, so that 1 cwt. of steamed bone flour supplied the same amount of phosphate as 3 cwt. of basic slag. Apart from these two manures, the other artificials employed to complete the manuring of Sections B and D were identical, but as no farmyard manure was applied, fairly liberal dressings were given.

The cropping was of a somewhat varied nature. The crops grown included potatoes, mangels (replaced later with rape), thousand-headed kale, turnips and swedes.

Starting from the outside of the Demonstration Area, a half-acre strip running right through the differently manured sections was put under potatoes for the purpose of testing the effects of the manuring on that crop. Five different varieties were grown—Arran Chief, Arran Comrade, Arran Victory, British Queen, and Majestic, and part of the seed of the first three varieties was sprouted prior to planting.

The next strip, 1 acre in extent, was sown with mangels, but this section unfortunately proved a failure. The crop came away splendidly at first, and was making excellent progress till some time after singling, when a particularly adverse spell of weather, accompanied by high winds, set in and simply ruined all prospect of a full crop. It was accordingly deemed advisable to resow this strip with rape.

The next acre was put under thousand-headed kale, a crop which was practically unknown in the district, but which, like its derivative marrow stem kale, is worthy of wider cultivation in Scotland.

The remaining $7\frac{1}{2}$ acres were reserved for turnips and swedes, several different varieties well known in the district being grown, and their cropping powers compared.

As already pointed out, the entire area was drilled right through the different sections A, B, C, D, so that the four different methods of manuring were tested on each of the crops grown.

The following plan gives fuller particulars of the cropping and manuring, and shows the position of the different crops on the area in season 1919.

PLAN II.

SCHEME OF CROPPING AND MANURING IN SEASON 1919.

POTATOES				$\frac{1}{2}$ acre.				
Artificial for Potatoes, Mangels, and Kale.	MANGELS			1	Artificial for Turnips and Swedes.			
	KALE			1				
				TURNIPS AND SWEDES $7\frac{1}{2}$				
A					A			
4 cwt. Super-phosphate.					2 cwt. Super-phosphate.			
1 cwt. Sulphate of Ammonia.	20	loads	Far	myard Manure in drill in Spring.	6 cwt. Basic Slag.			
2 cwt. Kainit.					$\frac{3}{4}$ cwt. Sulphate of Ammonia.			
B					B			
3 cwt. Super-phosphate.					3 cwt. Super-phosphate.			
2 cwt. Sulphate of Ammonia.	9	cwt.	Basic	Slag (20 %).	$1\frac{1}{2}$ cwt. Sulphate of Ammonia.			
4 cwt. Kainit.					2 cwt. Kainit.			
C					C			
4 cwt. Super-phosphate.					2 cwt. Super-phosphate.			
1 cwt. Sulphate of Ammonia.	20	loads	Far	myard Manure on stubble in Winter.	6 cwt. Basic Slag.			
2 cwt. Kainit.					$\frac{3}{4}$ cwt. Sulphate of Ammonia.			
D					D			
3 cwt. Super-phosphate.					3 cwt. Super-phosphate.			
2 cwt. Sulphate of Ammonia.	3	cwt.	Steamed	Bone Flour (60 %).	$1\frac{1}{2}$ cwt. Sulphate of Ammonia.			
4 cwt. Kainit.					2 cwt. Kainit.			

It will be seen from the above scheme of manuring that a small dressing of Kainit was used for potatoes, kale, and mangels on all the sections, also for turnips on the two sections getting no farmyard manure. A purer form of potash would have been preferred for potatoes, but was not available.

In addition to the manuring shown above, 3 cwt. of salt per acre were applied to the kale and mangel crops, and a further dressing of 1 cwt. nitrate of soda was put on the kale plot as a top-dressing soon after singling.

YIELDS OBTAINED PER ACRE.

Taking the potato crop first, the average yields per acre from the five varieties grown on the differently-manured sections were as follows:—

Section	Tons.	Cwt.
A (Farmyard Manure in drill)	10	4
" B (Basic Slag)	9	3½
" C (Farmyard Manure on stubble)	9	13½
" D (Steamed Bone Flour)	9	3¾

It will be seen from the above yields that Section A, which got the farmyard manure in the drill, gave the heaviest crop. That confirms results previously obtained in experiments carried out by the West of Scotland Agricultural College.

Section C, which got farmyard manure on the stubble, also responded fairly well, though the yield per acre is 10½ cwt. below that in Section A.

Basic slag and steamed bone flour were practically equal in their effect on the potato crop, when used in conjunction with the other artificials already referred to, but the yield per acre was fully a ton behind that obtained on Section A.

Of the different varieties of potatoes grown, Majestic proved to be the heaviest cropper and Arran Comrade the poorest. The average yield for each variety is given below:—

YIELD PER ACRE.

	Seed Unsprouted		Seed Sprouted.		Increase or Decrease (+ or -)	
	Tons.	Cwt.	Tons.	Cwt.	Tons.	Cwt.
Majestic	11	2	...	...	...	...
Arran Chief	9	2	10	6	+1	4
" Victory	9	4	9	16	+0	12
British Queen	8	16	...	...	...	...
Arran Comrade	7	12	7	1	-0	11

The benefits from sprouting were to a great extent nullified by the season, and more particularly by the way Arran

Comrade was affected. This variety, though generally classed as a Second Early, might almost be classed as an Early from its nature of growth. The season was a very dry one, and by the time it came Arran Comrade, where sprouted seed was used, had practically completed its growth, and consequently derived little or no benefit from the rain. If it had been lifted at that time, the yield, though small, would certainly have been considerably in advance of that from the unsprouted seed.

In the case of the other two varieties of which sprouted seed was used, though there was very considerable benefit from sprouting, that was a long way behind what has generally resulted in other experiments carried out by the College, as in these the difference in yield generally approximated to two tons per acre. The explanation for this is undoubtedly on the same lines as that already given for Arran Comrade, as the crop from unsprouted seed made better progress after rain came.

According to statistics supplied by the Board of Agriculture for Scotland, the average yield for the potato crop for the whole of Wigtownshire in 1919 was *6.4 tons per acre*. In view of this the yields given above are not unsatisfactory.

The yield from the acre under thousand-headed kale was very good, and would have been even better but for the fact that the crop was thinned out a little by the adverse weather from which the mangel crop suffered so badly. The small dressing of nitrate of soda (1 cwt. per acre), however, pushed the crop on past the risky stage, and practically ensured a good yield.

This crop always responds well to farmyard manure, and in consequence Section A, which got farmyard manure in the drill, always looked best, and finally gave the heaviest yield. The other section which received a dressing of farmyard manure came in second, but the yield from the sections which got artificials alone were also very satisfactory when allowance is made for the nature of the soil.

The yield per acre on the different sections was as follows :—

	Tons	Cwt
Section A (Farmyard Manure in drill)	22	15
„ B (Basic Slag)	19	0
„ C (Farmyard Manure on stubble)	20	10
„ D (Steamed Bone Flour).	18	11

Turnip and Swede Crop.—As has already been pointed out, the greater part of the area was reserved for this crop, which is a specially important crop in Wigtownshire. In all, eight different varieties were tested, five of them being varieties of swedes, and three varieties of common turnips.

Taking first of all the average yield per acre from all the varieties on the differently-manured sections, we find that the application of farmyard manure in the drill in spring is again vindicated, though the differences are relatively not so great as with the other crops. The average yields were as follows :—

	Tons.	Cwt.
Section A (Farmyard Manure in drill)	23	11
„ B (Basic Slag)	21	15
„ C (Farmyard Manure on stubble)	21	10
„ D (Steamed Bone Flour)	22	11

The average yield per acre for the county is given as *15·7 tons for season 1919*; the yield per acre on the Demonstration Area is therefore about 50 per cent in advance of that, and from that point of view may be considered good.

The yields obtained from the different varieties varied on the differently manured sections very much in the same way as the average yield set out above, and that fact makes the final result all the more reliable.

Certain of the varieties proved more suitable for the soil and district than others, but the variation in yield was not great, the whole crop being a particularly uniform one. The yields from the different varieties given below represent the average yield per acre over the differently manured sections :—

SWEDES—	Tons.	Cwt.
Alloway	24	9
Best of All	24	0
Magnum Bonum	23	0
Ne Plus Ultra	20	6½
Enterkin	20	6
COMMON TURNIPS—		
Fosterton Hybrid	23	10
Stobo Blue	23	7
Aberdeen Greentop Yellow	20	14

A largely-attended demonstration was held in the beginning of October before the crops were lifted, when full particulars were given as to the manuring, the varieties grown, &c.

The entire freedom of the turnip crop on every section from finger- and -toe disease was specially remarked on by those present, as they fully expected that the farmyard manure would have materially encouraged it. They were unanimous in their view that the section which got the farmyard manure in the drill would give fully the largest yield per acre, but they were of opinion that the turnips grown on the sections getting farmyard manure would not keep so well.

To put this to the test, arrangements were made for part of the crop from the differently-manured sections being put

up in separate pits. This was done, and when these pits were lifted in the spring, it was found that only a very small percentage of the turnips showed any signs of rotting, and that the manuring had had no pronounced effect on keeping properties. The basic-slag-grown turnips were the soundest, scarcely any having to be discarded; but even where the farmyard manure had been put in the drill, very few of the roots were affected. The common view, that the turnips grown on that section would not keep well, was accordingly found to be incorrect.

Reference has already been made to the fact that the mangel crop did not succeed, and that the acre plot allotted to it was resown with rape. Before sowing the rape, the land was drilled up as if for turnips, and the rape seed then sown with the ordinary turnip drill sowing machine. While this crop again proved a partial failure, the result obtained was of a specially educative nature in showing the importance of farmyard manure on such land for all root and green crops. An excellent crop was obtained on the section on which the farmyard manure had been applied in the drill; a partial crop where it had been applied on the stubble, and no crop at all where artificials had been applied.

By using farmyard manure there is much greater certainty of getting a crop, and seasonal variation has not the same influence. The partial failure of the crop referred to brought out more clearly than anything else could have done the importance of farmyard manure for light land of the nature of that which constituted the Demonstration Area.

CROPPING AND MANURING IN 1920.

In season 1920 the entire area was again put under oats, the chief object kept in view in arranging the cropping and manuring being to ascertain the relative residual effects from the manures applied to the sections A, B, C, D in 1919. Accordingly, one half of each of these sections ($1\frac{1}{2}$ acres) was sown with the same variety of oat, Victory being selected for that purpose. The other half of each section was reserved for a different variety of oat, this being done with a view to making the cropping more interesting, and also to further test the suitability of different varieties for the district.

A direct comparison of the different varieties could not, of course, be made, owing to differences in manuring in the previous year, but an indication of the relative productiveness of each variety was possible by comparing the yield with that from Victory oats on the same section.

The varieties included in addition to Victory were Record, Yields, Beseler, and Crown.

Eight acres were manured—4 acres on each side of the area—but a strip of 2 acres in extent running right down the centre was unmanured.

The dressing of manure given to the 8 acres was a uniform one, the actual prescription per acre being 2 cwt. superphosphate, $1\frac{1}{2}$ cwt. potash salts, and $\frac{2}{3}$ cwt. sulphate of ammonia. The scheme of cropping and manuring is set out on the accompanying plan (p. 131).

The manures were applied and harrowed in just immediately before the oats were drilled in.

Grass and clover seeds were sown down with the oats, and different mixtures were included for the purpose of testing their suitability for soils of the nature of that which formed the area. Throughout that locality there is still a tendency to sow too much ryegrass, and in planning the mixtures the amount of ryegrass was varied from a light seeding up to a fairly heavy seeding more in keeping with the common practice.

The value of Wild White Clover is beginning to be realised in the county, but to emphasize the importance of it for all mixtures that are to be down for three years or longer, the various mixtures were put down in duplicate, and in the duplicate plots half a pound of ordinary White Clover per acre was replaced with half a pound of Wild White Clover.

Before the grasses and clovers were sown the area was rolled; the seeds were then sown broadcast, very lightly harrowed in, and the area again rolled.

Particulars of the various mixtures are given below, and a plan (p. 132) showing their relative positions on the area.

PARTICULARS OF THE SEED MIXTURES.

Grasses and Clovers	No. 1		No. 2		No. 3		No. 4	
	Lb. per acre		Lb. per acre		Lb. per acre		Lb. per acre	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Perennial Ryegrass	6	6	12	12	18	18	24	24
Italian Ryegrass	3	3	6	6	9	9	12	12
Cocksfoot	6	6	6	6	6	6	3	3
Timothy	2	2	2	2	2	2	1	1
Tall Fescue	5	5	5	5	.	.	.	.
Meadow Fescue	5	5	.	.	.	.	.	.
Hard Fescue	1	1	1	1	.	.	.	.
Meadow Foxtail	1	1	.	.	.	.	.	.
Crested Dogtail	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
Red Clover	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Do. (late flowering)	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Alsike Clover	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
White Clover	$1\frac{1}{2}$	1	$1\frac{1}{2}$	1	$1\frac{1}{2}$	1	$1\frac{1}{2}$	1
Wild White Clover . . . . .	...	$\frac{1}{2}$	...	$\frac{1}{2}$	.	$\frac{1}{2}$	...	$\frac{1}{2}$

PLAN III.

SCHEME OF CROPPING AND MANURING IN 1920.

TREATMENT
IN 1919.

MANURED.

NO MANURE.

MANURED.

A Farmyard Manure in drill.		R	E	C	O	R	D		A
	V	I	C	T	O	R	Y		
B Basic Slag.	V	I	C	T	O	R	Y		B
	Y	I	E	L	D	E	R		
C Farmyard Manure on Stubble.	B	F	S	E	L	E	R		C
	V	I	C	T	O	R	Y		
D Steamed Bone Flour	V	I	C	T	O	R	Y		D
			C	R	O	W	N		

2 cwt. Superphosphate.
1 1/2 " Potash Salts.
3 " Sulphate of Ammonia.

2 cwt. Superphosphate.
1 1/2 " Potash Salts.
3 " Sulphate of Ammonia.

PLAN IV.

PLAN SHOWING RELATIVE POSITIONS OF MIXTURES OF GRASSES AND CLOVERS.

TREATMENT
IN 1919.

A Farmyard Manure in drill.	MIXTURE (b) (WILD WHITE)	No. I. (a) (NO WILD WHITE)	MIXTURE (a) (NO WILD WHITE)	No. III. (b) (WILD WHITE)	A
	(b) (WILD WHITE)	(a) (NO WILD WHITE)	(a) (NO WILD WHITE)	(b) (WILD WHITE)	
B Basic Slag.					B
C Farmyard Manure on Stubble.	MIXTURE (b) (WILD WHITE)	No. II. (a) (NO WILD WHITE)	MIXTURE (a) (NO WILD WHITE)	No. IV. (b) (WILD WHITE)	C
	(b) (WILD WHITE)	(a) (NO WILD WHITE)	(a) (NO WILD WHITE)	(b) (WILD WHITE)	
D Steamed Bone Flour					D
	(b) (WILD WHITE)	(a) (NO WILD WHITE)	(a) (NO WILD WHITE)	(b) (WILD WHITE)	

At the demonstration held in August 1920 very great interest was taken in the scheme of cropping, seeding, and manuring. It was quite apparent that the manuring in the two previous years was—in spite of the dressing of artificials applied in 1920—still having very pronounced effects, not only on the oat crop, but also on the grasses and clovers, more particularly the clovers.

Victory oats on the section which got the farmyard manure in the drill in the previous year gave promise of being easily the best yield from that variety, thereby again indicating the superiority of that method of manuring, when it can be accomplished, over the other methods adopted.

There was not so much difference apparent on the other sections, but the second best yield from Victory oats looked as if it would be obtained on Section C, to which farmyard manure had been applied on stubble.

The basic slag and steamed bone flour sections showed no difference as regards the half sections under Victory oats, the one being apparently quite as good as the other.

The yields from the other varieties of oats appeared to vary to some extent in a manner similar to that of Victory, but Crown in particular, though grown in Section D, which got no farmyard manure in the previous year, looked very promising, and almost as good as Record on the section which got farmyard manure in the drill in the previous year.

The 2-acre strip right down the centre of the area, and which got no artificial manure, was considerably behind the manured sections. This is all the more surprising in view of the fact that it was located on the strip which got the heavy dressing of artificials with the lea oats in 1918. Indeed there was quite a sharply-divided line showing where the unmanured section had ended and the heavily-manured section had commenced in that year. This made it quite apparent that the benefits from manuring lea oats did not end with the crop to which the manure was applied, but that the manuring had an effect on the succeeding oat crop, though a root crop had intervened.

On consideration it is not at all surprising that the first dressing of manure was not fully exhausted. It was pointed out earlier that the crop was much thinner on the ground in 1918 where no manure was applied, and doubtless the actual root development in the soil was even relatively less on that section, so that there was much less residue from stubble and roots left for the benefit of future crops, whereas on the manured section there was a much larger amount of residue of this sort as well as some phosphates not used up by the crops.

In view of the foregoing, the increase in yield on the manured

section is all the more striking. The average yield per acre from the 8 acres dressed with artificials and from the 2 acres which were unmanured, as well as the cost of the manure, and the value of the increase, at current prices is given below.

INCREASE FROM MANURING AND VALUE THEREOF
AT CURRENT RATES.

Treatment.	Average yield per acre. Grain	Straw.
2 cwt. Superphosphate	51 bushels	27½ cwt.
1½ cwt. Potash Salts		
½ cwt. Sulphate of Ammonia		
No Manure	41½ "	21¼ "
Increase due to manuring	9½ "	5½ "
Value of increase at 3s. per bushel of Oats and 2s. 6d. per cwt. of Straw	42s. 3d.	
Full cost of Manure applied	32s.	
Balance after deducting full cost of Manure	10s. 3d.	

The average yield for oats in Wigtownshire for season 1920, according to the figures supplied by the Board of Agriculture for Scotland, was $42\frac{1}{2}$ bushels, being just one bushel per acre above the yield obtained on the unmanured section. The yield on the 8 acres which were manured, though the dressing of manure was a light one, was, however, $8\frac{1}{2}$ bushels above the average for the county; and when allowance is made for the nature of the soil and the fact that the previous root crop was all carted off the field—no part being consumed on the ground—the average yield per acre of 51 bushels grain and $27\frac{1}{2}$ cwt. straw from the 8 acres that were manured is very satisfactory from every point of view.

With regard to the yields obtained on the sections that had been differently manured for the root crop, it was pointed out previously that one half of each section was sown with Victory oats, to determine the residual value of the manuring, and the other half with a different variety. The calculated yields per acre obtained from Victory on the various sections and from the other varieties are given below. Unfortunately in the leading of the crop, through a misunderstanding, some mixing took place with the Victory oats. The figures given, however, are substantially correct, and were fully confirmed

by the appearance of the crops on the different sections before harvest.

YIELDS PER ACRE IN 1920.

Section.	Manural Treatment for Root Crop 1919.	Variety of Oat	Grain	Straw.
			Bushels.	Cwt.
A	Farmyard Manure in drill	{ Record	55½	29
		{ Victory	53½	29½
B	Basic Slag	{ Victory	48	26
		{ Yielder	43½	22½
C	Farmyard Manure on Stubble	{ Beseler	50	28½
		{ Victory	52	28½
D	Steamed Bone Flour	{ Victory	49	26½
		{ Crown	54½	27½

CROPPING AND MANURING IN 1921.

The field was grazed for some time after harvest, as there was a good deal of red clover on the demonstration area, and also on the remainder of the field. The grazing, however, was comparatively light so as not to damage the "seeds."

It is the custom in Wigtownshire to put a good deal of the farmyard manure on the grass land, and in view thereof, and to test the efficacy of this method of manuring, Section D, which up to that time had been manured entirely with artificials, received, in the winter of 1920-21, a dressing of twenty loads per acre of well-made farmyard manure. This manure was spread uniformly as soon as it was carted out and was at a later date harrowed with the fog-harrow, in order to break it down more finely.

The 2½ acres comprising this section got no additional manure, as the manuring had been fairly liberal for the root crop in 1919 to compensate for the omission of farmyard manure. The other three sections got a dressing of artificials at the rate per acre of 5 cwt. basic slag, 2 cwt. potash salts, ¾ cwt. sulphate of ammonia, and ½ cwt. steamed bone flour.

It will be seen that very little nitrogen was applied, the aim being to encourage the clovers rather than the grasses, and enrich the land through the medium of the clovers.

Season 1921 was a dry one, and the hay crop all over was light. In spite of that, the yield on the demonstration area was very satisfactory, although the field does much better in a moist than in a dry year.

A very largely-attended demonstration was held in the end of June, just before the hay crop was cut, when the crops

The area is now under pasture, and will remain down for a period of four or five years, so that there will be ample opportunity for judging of the suitability of the seed mixtures put down for the purpose for which they are required—namely, the production of good grazing.

It is a comparatively simple matter to raise good crops of oats, turnips, hay, &c., but good grass is not so easily obtained, and though the demonstration area has served a very useful purpose up to the present, in the next two or three years it is expected that it will play an equally useful, and possibly a still more helpful part.

SUMMARY OF RESULTS.

Season.	Crop.	Average Yield from all Manured Sections	Average Yield for the County.
1918	Oats . . .	*66 bushels . . .	16½ bushels.
1919	(Turnips . . .	22.3 tons . . .	15.7 tons.
	(Potatoes . . .	9.5 tons . . .	6.4 tons.
1920	Oats . . .	51 bushels. . .	42½ bushels.
1921	Hay . . .	43.2 cwt. . . .	19.9 cwt.

* Includes about 5 bushels seeds.

The writer would like to take the opportunity to place on record his great appreciation of the services rendered by Mr Ferguson, the tenant of the farm, and to thank him, on behalf of the Governors of the College, for the efficient manner in which the entire work in connection with the Demonstration Area has been carried out.

He also desires to thank Mr Kay, the Instructor for the County, for much valuable help.

GRAPHIC METHODS OF REPRESENTATION OF ESTATE AND FARM ACCOUNTS.

By "WIRELESS."

GRAPHIC representation is not an innovation. The system is based on the simplest method of communicating information—pictorial representation. It is as ancient as the hills. It is recorded that Belshazzar, the King of the Chaldeans, was considering it, but being killed during the night of the day on which he became interested, he had little time to become an enthusiast! More recently it has been a *sine qua non* in all efficient commercial and other concerns; but its great utility has yet to be fully appreciated in the realm of practical agriculture.

In these days of rapid change, when every scientific aid must be utilised, graphic representation gives maximum benefit with minimum trouble. Its application is unlimited, and on account of its ceaseless possibilities, the more it is relied on the more fascinating and beneficial it becomes.

Facts alone are not significant. Everything depends on their relation to other facts.

Being centralised, information graphically recorded can be read with consummate ease, and definite conclusions instantly drawn for future guidance. Instructive retrospects are always available, and future operations can more confidently be initiated. Graphic records are time-savers. No pondering over masses of more or less unintelligible figures is entailed. A glance conveys an immediate and correct impression of the exact state of matters.

It is quite unnecessary to emphasise the merits of the system. A few examples will be sufficient to elucidate its seeming mysteries, and permit amplification in any desired direction.

The system can be inaugurated with very little expense. Square-ruled paper, coloured inks, pen, pencil, and ruler comprise the outfit. Coloured inks are not absolutely essential, but they are a decided benefit.

Simplicity is the keynote of the system. Overloaded records lead to confusion.

The accompanying illustrations show how varied the graphic records, or charts, as they are called, may be. Those

shown in the photographs all contain more or less confidential information. Nevertheless, they can be displayed to public gaze without divulging secrets. When hung like pictures, charts are ready, available for reference at all times. Continual reference automatically renders the employment of "a key" unnecessary. When private information is displayed in this way, the key is kept in a place inaccessible to outsiders. When charts contain no confidential information, all details can be shown upon them. There is then no need for a key.

A convenient form of paper for the system is one ruled in 1-inch squares, with each square subdivided by fainter lines into a hundred small squares. This paper simplifies and facilitates the preparation of the charts. The tenth part of an inch can be taken for "the unit" of the record. Consequently the darker lines at succeeding inches, being decimal multiples, enable the chart to be compiled with ease. The paper can be purchased in sheets or rolls. The latter can be cut to any size desired. Paper, square-ruled, in various sizes, can also be obtained without the darker lines at every inch.

The size of the paper taken for the chart determines the detail of the information to be shown.

For example, assume that a monthly expenditure chart in connection with one department or one item is required, and that a sheet of square-ruled paper 10 inches by 13 inches is taken. If the paper have the darker lines, it will already be marked into thirteen columns by the darker vertical lines. The twelve months of the year will therefore easily fit in, and leave the left-hand column or inch for the insertion of a column of figures showing pounds sterling. If the total monthly expenditure be below £90, by allocating £10 to each vertical inch there will be a clear one-inch horizontal space at the top or bottom of the chart for the insertion of the names of the months. If the monthly expenditure range up to £900, then £100 must be allocated to each vertical inch. This will still leave the same clear horizontal space for the names of the months. It will readily be seen that in the former case each small square in the money column will represent a unit of £1, and in the latter £10. Taking £10 as the unit of the chart, insert "Unit £10," or simply "£10," in the inch square at the foot of the left-hand column. The increasing values, which the succeeding inch lines of that column represent, are then placed on them, beginning with "0" at the datum, 1 inch from the bottom of the paper, followed by "£100," "£200," "£300," "£400," &c. The top of the chart will represent the £900 line. It should be noted that the figures should be placed through the lines, not above or below them. The names of the months are then

inserted horizontally in the bottom inch space of their relative columns.

If the paper will go into its carriage, a typewriter is of great assistance in the preparation of charts. The lettering and figuring can be quickly, neatly, and accurately done. A more effective chart is thus obtained. A typewriter, however, is not an essential. The letters and figures can easily be written in. In large charts a hand-numbering machine expedites the figuring, and the words can be architecturally printed. The fewer flourishes there are the better.

Assume that the information to be recorded is :—

1919.

Jan..	.	.	£600	July	.	.	£400
Feb.	.	.	450	Aug.	.	.	500
March	.	.	500	Sept.	.	.	650
April	.	.	320	Oct.	.	.	700
May	.	.	170	Nov.	.	.	550
June	.	.	Nil	Dec.	.	.	460

Total—£5300.

1920.

Jan.	.	.	£120	July	.	.	£600
Feb.	.	.	610	Aug.	.	.	450
March	.	.	300	Sept.	.	.	320
April	.	.	550	Oct.	.	.	Nil
May	.	.	410	Nov.	.	.	200
June	.	.	50	Dec.	.	.	490

Total—£4400.

1921.

Jan.	.	.	£370	April	.	.	£350
Feb.	.	.	275	May	.	.	350
March	.	.	600	June	.	.	500

and that the chart is being prepared in July 1921, at which date only the figures for the first six months of that year will be known.

Adopting the linear delineation, in the centre of the January column and on the horizontal £600 line place a pencil dot. In the centre of the February column and on the £450 line place another dot. Treat the other monthly columns in a similar manner by placing the dots on the respective value horizontal lines. The linking up of the dots by a continuous line will give the line, or curve, as it is called, for 1919.

Deal with 1920 in a similar manner, and link up its dots by a continuous line of a differently coloured ink, or by a dotted line if the same ink be employed.

Fill in the details for the first half of 1921, using another ink, or varying the nature of the line if the same ink be used

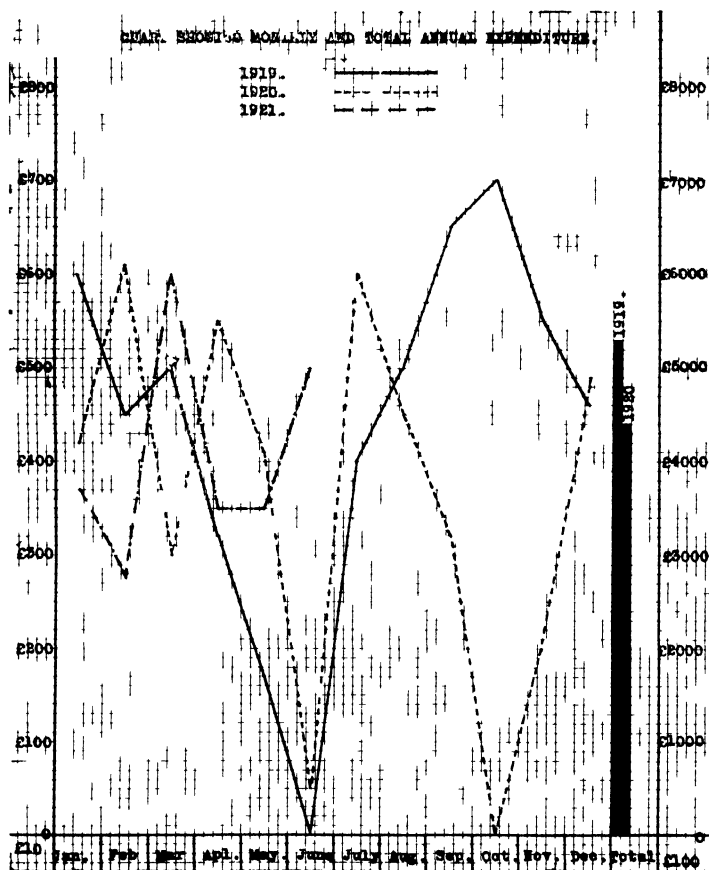


Fig. 5

When this has been done the chart will give the monthly details for a period of two and a half years.

At the end of July 1921 the line for that month can be added, and so on monthly till the end of that year, when there will be a detailed, effective, and readily available retrospect of the previous three years. No time need be lost looking for mislaid account books, and wearily spent extracting details in order to gauge the outlook for the coming year.

or years. The general trend of affairs can be judged at once from the chart, and future action based accordingly.

The foregoing figures have been plotted on the chart shown in Fig. 5. This is a chart showing the total annual expenditure as well as the monthly expenditure. Paper without the darker lines at every inch has been used, and half-inch columns have been adopted. It will be noticed that it is not necessary to carry the lines dividing the monthly columns above the datum line. The "curves" stand out better without them. They can, however, be inserted if desired. The monthly expenditure is read by the money column at the left, and the annual expenditure by the one on the right. The unit of the former is £10, and of the latter £100. Had the annual expenditure the same unit as the monthly expenditure, a column 53 inches long would have been necessary to show the £5300 spent in 1919. By increasing the unit from £10 to £100, the column required only measures 5 $\frac{1}{2}$ inches. This will easily fit into the chart, and thus show the annual expenditure alongside the monthly details. As the total column is half an inch—i.e., five-tenths—wide, by using one-tenth for each of the annual columns the chart will last for five years before the full width has been filled in. If differently-coloured inks be employed, the annual columns can be shown in the same colours as those used for their respective monthly details. The key to this chart has been placed at the top below the title.

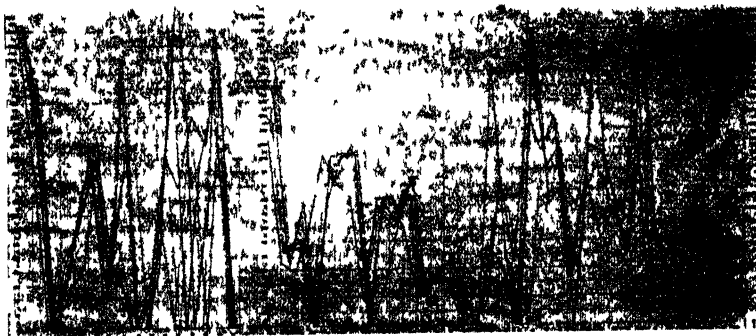
With the foregoing as a foundation, charts of infinite variety and unlimited application can be framed. A similar one can be used for income. The units can be varied. The money columns can be utilised to read tons, acres, gallons, numbers, &c. The monthly spaces can be used for hours, days, weeks, years, different departments, and many other things.

The charts can be made uniform in size and kept in a file, or they may be framed and covered with glass like a picture. There need be nothing unusual about the frames. When plain, they are much more effective. A frame can be made to fit any odd wall space, and the chart made to fit the frame. Thin wooden removable backs enable the charts to be taken out and replaced expeditiously. Any old derelict frame will come in handy. With all due deference to the directors of insurance companies, the frames of the show-cards issued to their agents form capital receptacles for graphic records! *Necessitas non habet legem.*

A short description of one or two charts in daily use may perhaps be interesting and useful.

Fig. 6 is a photograph of a chart giving at a glance the annual income and expenditure of an estate for a period of seven years, and it will be available for the recording of three

more years. The income has sixteen departments and the expenditure thirty-one. As additional headings occasionally crop up, one has been allowed for in the income and four in the expenditure. As this chart is displayed on an office wall, symbols have been adopted to denote the details which give confidential information. The symbols and their re-



spective explanations appear on "the key," which is kept in a private place. The following is not a portion of the actual key. It has been drawn up simply as a specimen.

<i>Symbol.</i>	<i>Explanation.</i>
A.	Income.
B.	Expenditure
Black Figures.	Pounds sterling.
Red Figures.	Unit in do.
A. 1.	Rents.
A. 2.	Game.
A. 3.	Woods.
A. 4.	Nursery.
B. 1.	Public Burdens.
B. 2.	Fire Insurance.
B. 3.	Donations.
B. 4.	Game.

A range of from nothing to £30,000 had to be allowed for in this chart, and had the unit been a uniform one a chart of unwieldy dimensions would have been necessary. The unit was therefore varied. In this way small income or expenditure is practically absolutely, accurately shown, and the figures for large income or expenditure are shown in sufficient detail for practical purposes. It serves no practical

purpose to make charts of this nature to show "shillings and pence," or, within limits, "pounds" in the higher reaches. To facilitate reading, three vertical money columns were inserted, the centre one separating the income from the expenditure. A differently-coloured ink was employed for each year. In order to obviate line confusion, a separate vertical line within the individual columns was taken for

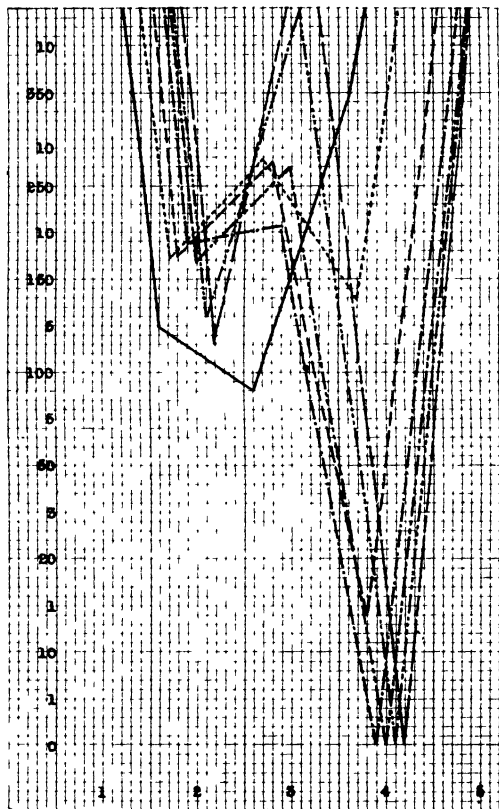


Fig. 7.

each year's record. This chart only requires to be taken down once a year for the recording of the annual totals. A partial enlargement appears in Fig. 7. The figures along the bottom represent the various departments, to each of which a column 1 inch wide has been allowed, the darker lines of the paper forming the divisions. The vertical column of figures gives the values at every inch. As the unit is a varied one, the unit for each section has been placed between the

values shown. Up to £20 the unit is £1; from £20 to £50, £3; from £50 to £150, £5; and from £150 to the top of the enlargement, £10. In the chart itself the unit is larger as the higher values are reached. Another feature of the chart is that the figures representing the departments and those showing the values are in black, while those of the units are in red. Department 4 distinctly shows the advantage to be gained by taking a separate vertical line, or space if preferred, for each year's record. Had the centre vertical lines of the columns been adopted for the recording, seeing there was no expenditure in this department in the fourth, fifth, sixth, and seventh years, the lines for these years would all have had to be drawn to the same point on the datum line of this column and thus been confusing, even if of different colours. By drawing the record lines to a point half-way between the horizontal lines of the 0 to £20 section, values of ten shillings can be shown, and by quartering the space even of five shillings. In the £20 to £50 section with its £3 unit, the half-way point would represent £1, 10s. Thus while £23 would be shown on the horizontal line immediately above "20," £21, 10s. would be midway between these two lines.

Fig. 8 is a photograph of the graphic record of the financial position of the woods on an estate over a period of twenty years. This chart, framed like the former one, gives the valuation of the growing stock when the working plan was drawn up, as well as the income and expenditure during the twenty years. These details are shown not only for the woods as a whole, but also for the sixty-four separate compartments into which the timber area is divided. The vertical column in the centre is the value column, but the sign of pounds sterling has not been placed upon it, as this chart is also fixed on a wall. The unit is £100, so that each vertical inch represents £1000. The vertical column, which as far as casual observers, even those possessing a knowledge of graphic records, are concerned, might represent pounds sterling, tons, acres, lbs., or anything else, has been placed in the centre of this long chart to enable reference to be made to its right or left. In this way vertical columns at the sides have been dispensed with. Attention to details of this nature in the preliminary planning of charts minimises the chance of subsequent errors and misfits, which, although perhaps not apparent to all, are a source of annoyance to the enthusiast. Three colours are employed. In each compartment the value of its growing stock, if any, was first shown in purple. The yearly expenditure, if any, is annually added in yellow above it and alongside the annual income, if any, in black. Thus the chart shows at a glance whether any particular compartment has been remunerative in a money form or not. It shows where selling has taken place, and also

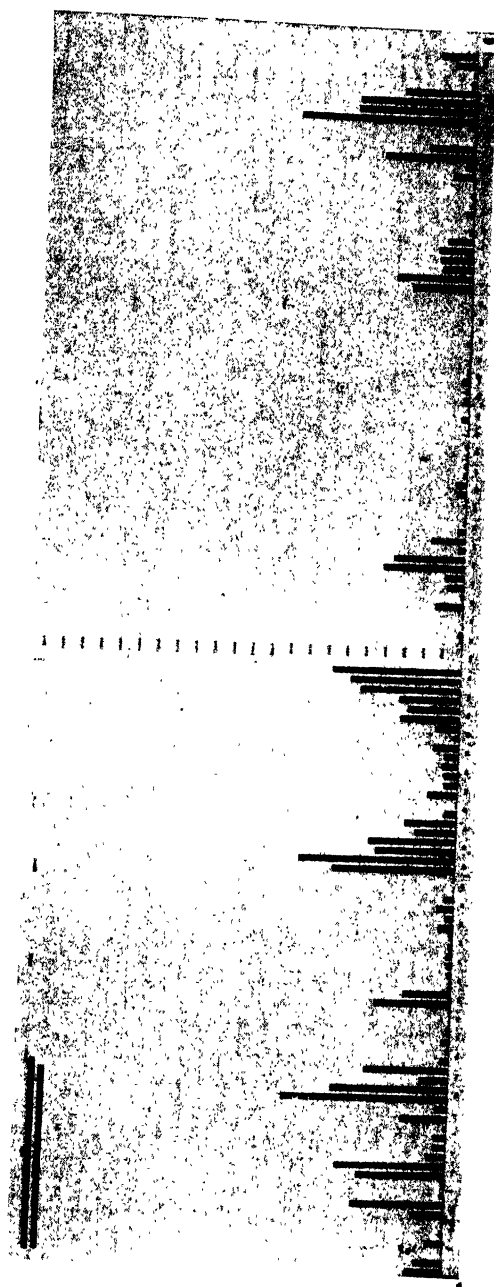


Fig. 8.

where future felling may be looked for. A partial enlargement in black appears in Fig. 9. The various woods are represented by their numbers, "29" to "36." The number "100" represents the unit, and is in red figures in the original chart. Wood No. 31 shows the original value of the growing stock at practically £3400, and expenditure of nearly £1900, and a cash return of only £3170. Wood No. 35 shows there was no growing stock when the working plan was drawn

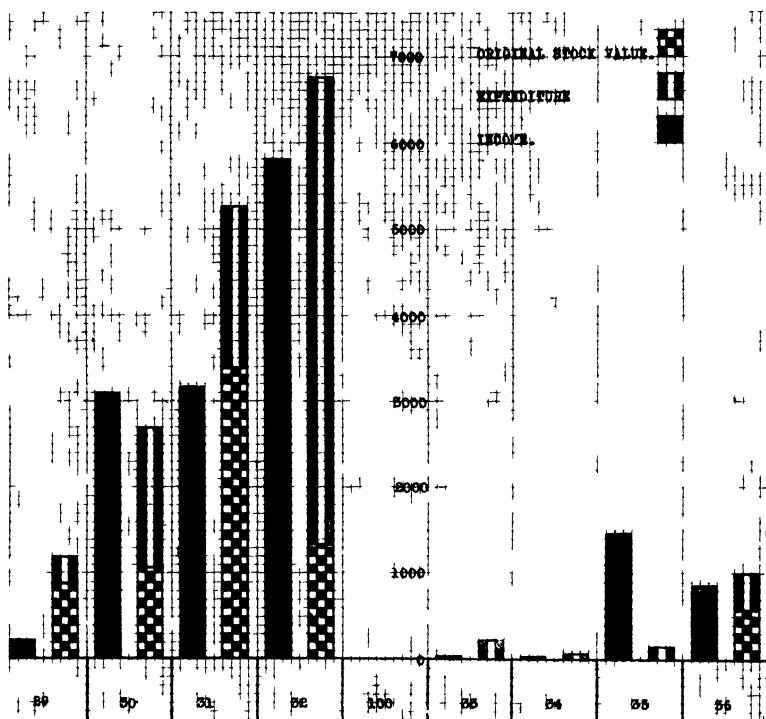


Fig. 9

up, that £150 has been spent upon it, and that the income has been £1470. The graphic record of the timber area as a whole for the two decades appears in the left upper corner of the chart, Fig. 8. Here, in order to avoid clashing with the rest of the record, the columns run horizontally, and the unit as shown by the letter "M" is £1000. Consequently each inch represents £10,000. The colouring is the same. This portion of the chart indicates that during the twenty years the owner of the woods has received a cash return practically equal to the value of the growing timber twenty years ago, calculated at the then values, plus his expenditure during that period.

In the series under review, some of the other estate charts, all variations of the form given in Fig. 5, are :—

Annual Returns of Mineral Output and Lordship.

Monthly and Annual Receipts from the Woodlands.

Monthly and Annual Receipts from the Gardens which are run on market-garden lines

The Annual Game Bag

Weekly and Annual Figures of Rabbits killed

The last-mentioned chart is specially to be recommended to those estate owners who contemplate forestry operations. A continuous record of the ground game in this way will at

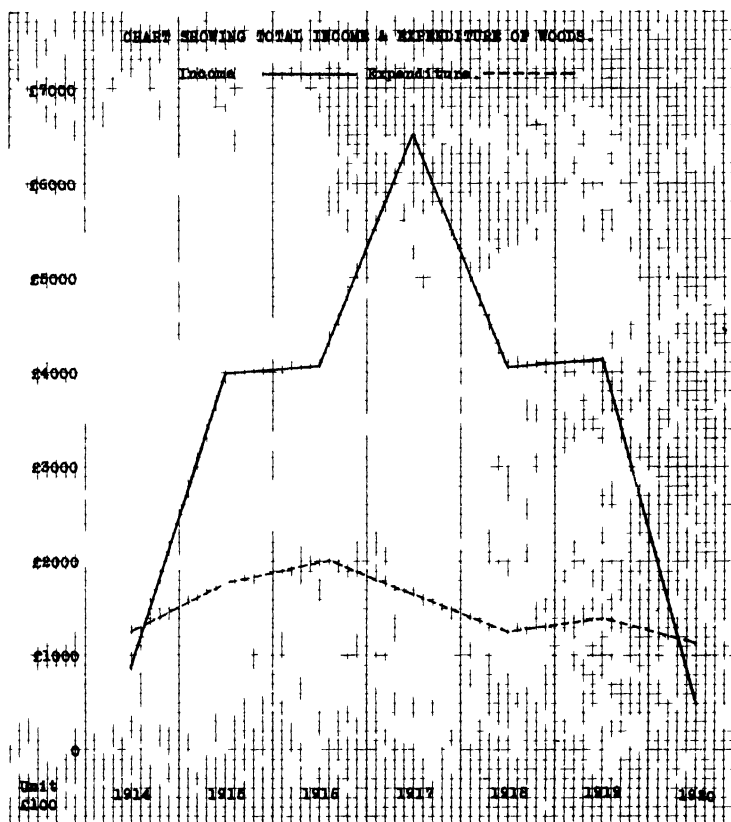


Fig 10

once show them whether their schemes are likely to be successful or are doomed to failure unless remedial measures are immediately undertaken

Fig. 10 gives another chart which should be interesting

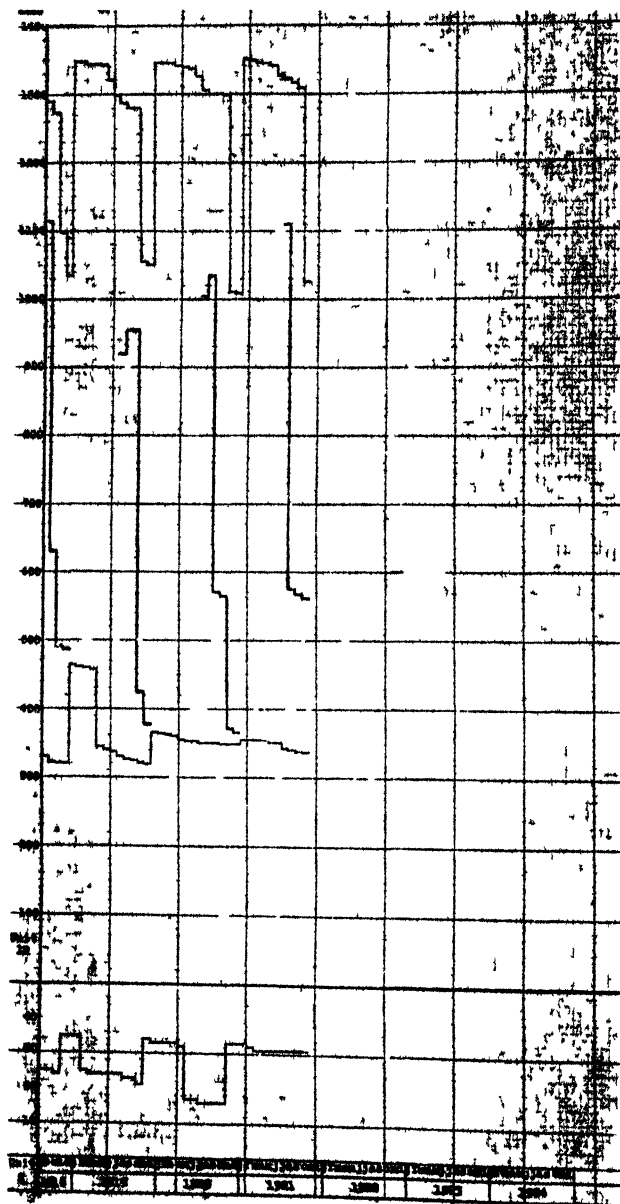


Fig. 11

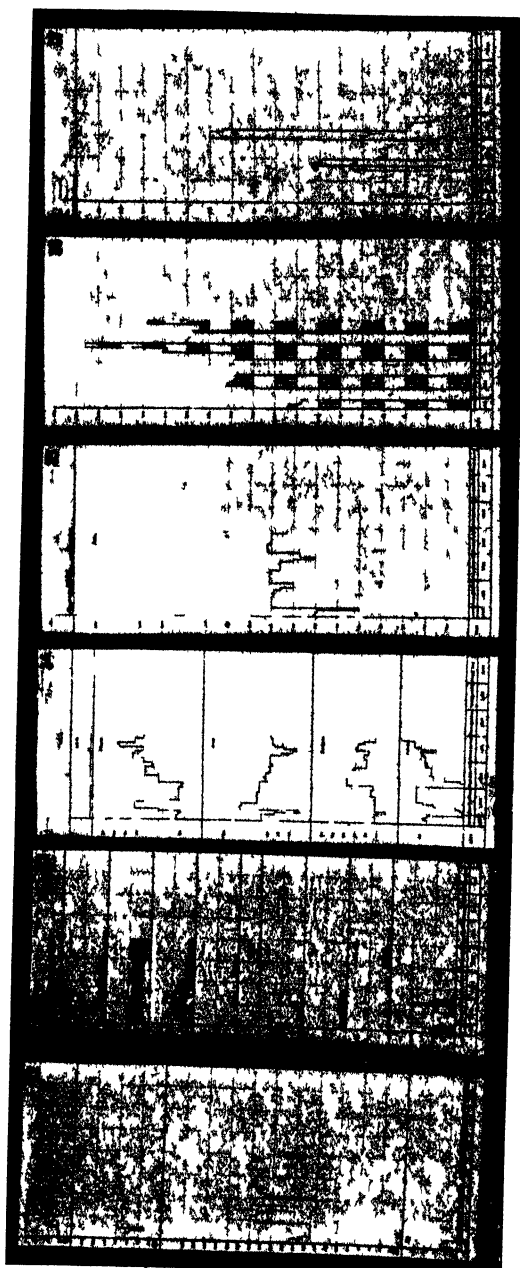


Fig. 12

and beneficial to the owners of woodlands. It is typical of most estate timber areas during the past few years. In 1914 the expenditure was more than the income. Owing to the enhanced prices during the war period the income considerably exceeded the expenditure. In 1920 the situation returned to its pre-war condition.

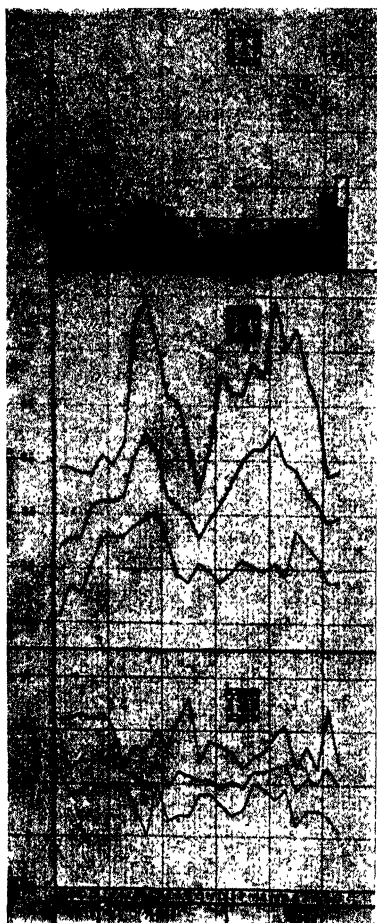


Fig. 13.

Fig. 11 shows a chart giving the monthly stock records of a sheep farm from August 1918 to October 1921, and one which will be available till December 1924. In this case the darker lines of the paper have been disregarded. The years are noted at the foot. The somewhat mysterious lettering immediately above is simply the initial letters of the names of the months. The chart is divided into two portions, the lower part having a unit of two and the upper a unit of ten. The rams are shown in the lower portion in black, and the ewes, ewe hoggs, and lambs in different colours in the upper.

Fig. 12 is a set of six charts giving the monthly stock records of an arable farm in a similar manner. Chart No. 32 shows the total numbers of horses, cattle, sheep, and pigs. Charts Nos. 33 to 37 give the division of the horses into geldings, mares, colts, and foals; of the cattle into bulls, steers, cows, heifers,

and calves; and similarly with the sheep and pigs. Various methods of recording are seen in these charts.

Fig. 13 is a photograph of a portion of a chart in connection with the monthly milk records of a small dairy herd from September 1919 to October 1921. This chart is divided into three parts, each with its own datum line. In Part 1

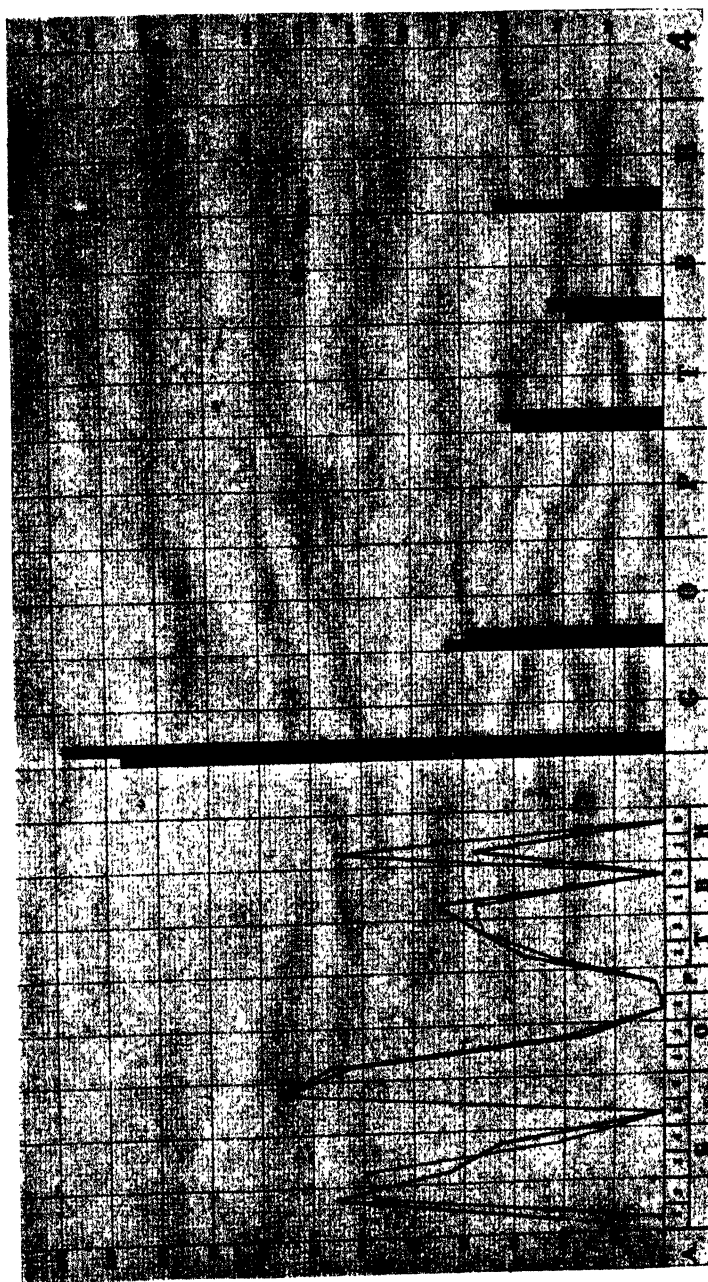


Fig. 14.

the number of the cows in the herd is got by reading from the datum line to the top line of the record. The number of cows tested is indicated by the dark portion of the record. Thus in September 1921 there were 15 cows in the herd, and 13 of them were tested. In Parts 2 and 3 of this chart differently-coloured inks are used. Part 2 gives the maximum, average, and minimum yield in lbs. at each test. Part 3 shows the maximum, average, and minimum percentage of butter fat.

Fig. 14 is an illustration of a portion of a chart giving the details of the cropping on a farm for two years, and one

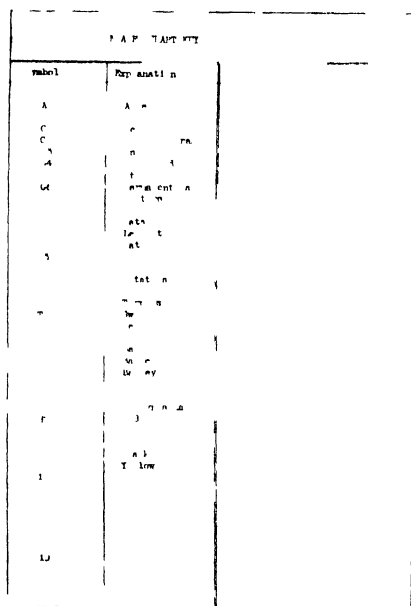


Fig. 15

which will be available for the recording of eight years more. The key appears in Fig. 15.

Other very useful and interesting charts in connection with farms show—

Monthly and Annual Income and Expenditure of the various departments.

Monthly and Annual Mortality of the different kinds of Stock.

Annual Classified Mortality of each Hired.

Prices received for Stock, &c., as compared with the average local market rate at the time.

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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Another chart shows the fluctuations in the cost of living.
Fig. 16 shows three keys.

The chart shown in Fig 17 gives the state of the general funds of the Highland and Agricultural Society of Scotland as at 30th November 1901 and 1921.

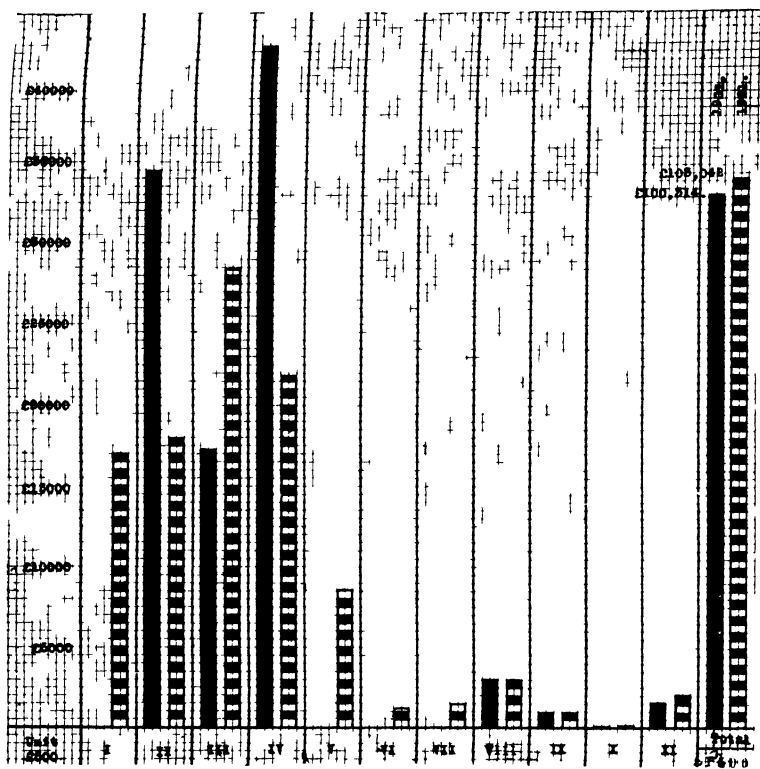


Fig. 17

The Roman numerals at foot of chart refer to the following: I War Stock, II Heritable bonds, III Railway Debenture and Preference Stocks, IV Bank Stocks, V Colonial Government Stocks, VI Annuity Stocks, VII Temporary Loans, VIII Estimated Value of Building No. 3 George IV Bridge, IX Estimated Value of Furniture, Paintings, books, &c, X Arrears of Subscriptions, XI Balance at 30th November — See *Accounts* p. 395

The more comprehensively the system is applied to meet existing circumstances, the greater will be the benefit derived. The time spent in the preparation of the charts will be repaid many times over. There will be no circumlocution in arriving at cardinal facts at any time.

One last word: The charts must be kept up to date.

INSECT AND ARACHNID PESTS OF 1921.

By R. STEWART MACDOUGALL, M.A., D.Sc., F.R.S.E.,
Consulting Entomologist to the Society

THE TIGER BEETLE (*Cicindela campestris*).

THIS gaily-coloured three-quarters of an inch long beetle may be found from the end of April onwards through the summer, on sunny days, making short rapid flights or running actively on dry roads or grass or sandy banks. Its prevailing colour above is grass-green, with a few white or yellow-white spots on the wing-covers; the long legs are for the most part coppery-red; under side of body shining green or blue-green, flashing in the sun as the beetle flies. The long, slender, eleven-jointed antennæ arise from the forehead above the base of the jaws: the head is broad, and the eyes are prominent. The mandibles are long and sickle-like, each armed with a sharp-pointed tooth, indicating the predaceous habit of the adult, which chases, catches, and destroys other insects (Fig. 18).

The larva of the Tiger Beetle is also carnivorous. It lives in a dug-out, tunnelled vertically in the soil. The burrow is several inches deep—deeper or shallower according to the nature of the soil—and is made by the larva. The burrows of the larvæ are made in sandbanks, in sand and soil at the edges of sandy roads, in peat, in cattle-tracks where the heather has been worn away. The larva seizes passing insects, which are dragged down into the burrow, and devoured or sucked dry.

The female beetle, after pairing, chooses a suitable place for her egg-laying, extends her egg-laying apparatus, breaks the ground by means of its horny tip, introduces the hind end of her body, and lays an egg. The place where each egg is laid is covered over with soil, the two horny ends of the egg-laying apparatus being used as rakes. The beetles are long-lived, can lay at least fifty eggs, and may hibernate, after laying eggs in one season, to reappear in the next late spring or early summer.

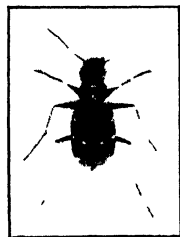


Fig. 18.—*Cicindela campestris*.

Natural size. From nature

The full-grown larva measures about an inch in length; the body is yellowish-white and fleshy; the head is flat and somewhat concave on the upper surface; the mouth parts are well developed, the mandibles being large and sickle-like; there are simple eyes on each side of the head, and minute four-jointed antennæ are present; the thorax carries three pairs of legs; the first joint of the thorax is half-moon shaped, and has, on its upper surface, a horny plate; the other two joints of the thorax have dark plates; the eighth joint of the body has a tubercle or hump on its upper surface, armed with two bent hooks.

The shaft or burrow is dug out by the larva, and is deepened and widened as required. The mouth of the shaft is rounded and regular. When the larva is on the look-out for prey in the shape of passing insects, its flat head plugs up the entrance to the shaft in stopper or trap-door-like fashion, the eyes being so situated that observation of the immediate surroundings is possible. Passing insects are seized, taken down into the dug-out, and destroyed. The shaft is considerably deeper than the length of the grub, but the grub climbs easily, and its position at the top part of the shaft is retained by aid of the hooks on the eighth joint, which are pushed into the sand or soil, also by the sinuous S-like curve of the body, and by the somewhat conical hind end which gives a hold. In confinement the grubs willingly fed on blue-bottles and small pieces of flesh; small caterpillars and maggots offered them were also taken.

The life-cycle, from egg to the appearance of the adult above ground, takes four years. The larva at the end of autumn in each year of its life closes up the mouth of the shaft as a preparation for hibernation, opening up the shaft again in the next late spring or early summer. Pupation takes place, after the final closing up of the burrow, in a chamber. The pupa lies on its back, four pairs of projections from the back keeping the body from the damp soil.

HARPALUS RUFICORNIS.

This is a widely-distributed Ground Beetle. The Ground Beetles (family *Carabidae*) are so called from the fact that most of them live on and in the ground, flying wings being absent or rudimentary; the hard wing-covers are often not separable, but act as protective in the case of burrowing. The beetles have all six legs fitted for running. They come near in relationship to the Tiger Beetles, but they are nocturnal forms, with inconspicuous colour (some species run about freely in the sunshine). The head is narrower than the thorax,

and the antennæ arise at the side of the head between the base of the mandibles and the eyes. Both adult and larvæ are carnivorous or feeders on carrion; they feed on caterpillars, other beetles, snails. A few have been found attacking plants—*e.g.*, corn and mangolds and strawberries. One of these is *Harpalus ruficornis*, which has been detected attacking strawberries, and has been sent to me as occurring in large numbers in raspberry plantations in Scotland, although not charged with damage to the rasps.

Harpalus ruficornis (Fig. 19) is a black or dull-coloured species, which has the hind angles of the thorax sharp and projecting. The wing-covers when examined with a hand-lens show fine lines running down them and a covering of yellow-grey delicate hairs. This species has flying wings.

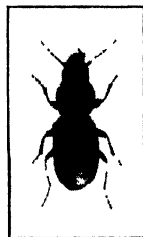


Fig. 19.—*Harpalus ruficornis*.

Natural size.
From nature.

LARVÆ OF GROUND BEETLES.

Year after year such larvæ reach me with request for determination. The larvæ are found in the soil, and allotment-holders are constantly turning them up. The larvæ should not be killed, as by preying upon other and harmful soil-infesting forms they are allies of the farmer. Fig. 20 should

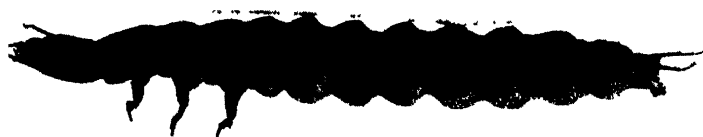


Fig. 20.—*Larva of a Ground Beetle.*

Magnified about 3½ times. From nature.

help to make the recognition of such larvæ easy. The body is elongated; the jaws are prominent and like calipers; each of the three joints behind the head carries a pair of legs ending in two claws; the last joint of the body bears two projections (cerci), between which is a stouter tube-like process. The general colour is brown or brown-red or yellow-brown.

CALOSOMA SYCOPHANTA.

This handsome golden-green species of the family *Carabidæ* (Fig. 21) is found in Britain only in the very south, and is not common.

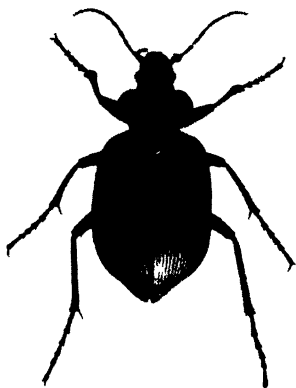


Fig. 21 — *Calosoma sycophanta*
Natural size. From nature

In central and south Europe it is not uncommon, and from its carnivorous habits has been introduced from Italy and France and Switzerland into the United States, where it has been bred in confinement and then set free in the woods in order to prey on the caterpillars and pupæ of the Gipsy Moth and the Brown-tail Moth. The adult beetles and the larvæ are active and excellent climbers, and their searching for, and destruction of, caterpillars and pupæ has more than justified the experimental introduction of the species to America. For pupation the *Calosoma* larvæ leave the trees and enter the soil.

Calosoma sycophanta has, since its introduction, established itself in several regions in the East United States, and its area is gradually extending.

THE COCKTAIL BEETLE OR DEVIL'S COACH-HORSE BEETLE (*Orypus olens*).

This beetle belongs to the family of Rove Beetles (*Staphylinidæ*), another family helpful rather than harmful in agriculture, adult and larva being predaceous on insects, worms, and snails, or feeders on carrion. The family of Rove Beetles is a large one, rich in species, but recognisable as a family by the very short wing-covers—so short that the greater part of the hind body is exposed—and by the mobile joints of the hind body. The tail can be erected. In the species with well-developed flying wings, the wings, when not in use, are folded beneath the short wing-covers.

Orypus olens, the Cocktail Beetle, is a common beetle found in decaying vegetable matter, in the soil, under stones and clods, under leaves, and sometimes indoors. The name Cocktail is due to its habit, when annoyed or alarmed, of erecting the tail-end of the abdomen and bending it over

the body. In doing this it gives out a defensive and evil-smelling fluid from a pair of glands at the tip of the tail, hence its specific name *olens* (stinking or smelling).

The beetle (Fig. 22) is dull black in colour. The head is as broad as the thorax; antennæ black, with end joints lighter; thorax square. Wing-covers reach only to end of thorax; flying-wings present.

The larvæ of Rove Beetles can be confused with those of the Ground Beetles, but in the Rove Beetle larvæ the legs are not so well developed, and there is only one claw to the feet.

Many of the Rove Beetles are quite small.



Fig. 22.—*Ocypus olens*.
Natural size. From nature.

This beetle (Fig. 23) was sent from Inverness-shire for determination. It belongs to the family of *Lamellicornis*, the same family of beetles as the Cockchafer and the Garden Chafer, but its habits are different. The adults are found flying about flowers in their search for pollen. The larva lives in the decaying wood of certain broad-leaved trees—a habit characteristic of the allied and rare species *Gnorimus nobilis*, a beetle of the south of England. Some years ago I bred, from a stem of cherry that had been killed by a fungus, sixteen specimens of this *Gnorimus*.

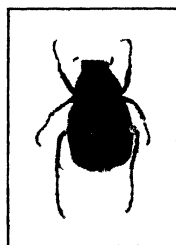


Fig. 23.—*Trichius fasciatus*.

Natural size From nature.

Trichius fasciatus is a pretty beetle, the head and thorax being covered with yellowish downy hairs; the wing-covers are orange-yellow, with a black band in front, and two dark blotches or bands at the middle and the hind end; the wing-covers do not quite reach to the tip of the abdomen.

SINODENDRON CYLINDRICUM.

This is another of the *Lamellicorn* beetles. The beetle is rare in Scotland, or at any rate not often reported. I got it some years ago in Peeblesshire, and now I have to report it from Nairn. The adult varies in length from one-third to about half an inch; colour, black; shape, elongated and rounded; head, small, and with a recurved horn on its upper

surface; this horn is larger in the male, and shows yellow hairs on its upper hind portion; the smaller horn of the female is unadorned. Thorax, shining black, and somewhat hollowed out in front; three minute teeth are visible by aid of a lens on the front edge at the top of the hollow; antennæ and feet, red.

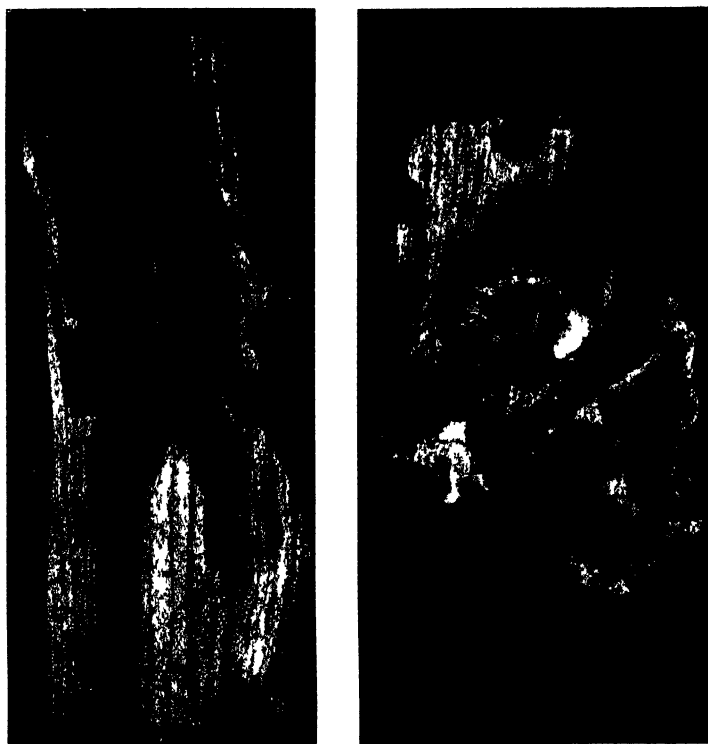


Fig. 24.

On the left a piece of ash wood showing galleries gnawed by Smodendion larva. An adult beetle is also seen in the chamber where pupation took place. On the right a piece of ash wood showing adults and larva in situ.

The figures are from nature and natural size.

The larva is a typical *Lamellicorn* grub, with brown head and distinct jaws. Minute four-jointed antennæ are present. Body, fleshy and curled, and dirty-white in colour. The thorax has three pairs of legs.

The female lays her eggs on dead decaying stems of ash, elm, oak, beech, willow, and the grubs gnaw passages in the wood, crumbling it and helping to reduce the wood to a

powdery mass. The full-fed grub pupates where it has been feeding. Fig. 24 is from a short paper I wrote some years ago on this and allied beetles in the 'Transactions' of the Royal Scottish Arboricultural Society.

MELOË VIOLACEUS.

This interesting species was sent to me for determination, from near Brechin. It was found in a clump of grass on the edge of a sheep-track in May, at a height of 800 to 900 feet above sea-level. The beetle (Fig. 25) is violet or bluish in colour; head, large; thorax, small; wing-covers, separated behind and not reaching the tip of the abdomen, so that the abdomen is exposed.

Meloë beetles have an extraordinary life history, as in species described there is a larva which passes through stages that differ from one another in form and in nature of food.

The female *Meloë*, abdomen swollen with eggs, lays her eggs in the soil. From these eggs hatch minute larvæ with jaws and six legs, each leg ending in three small claws. In order to complete the life-history, this larva must reach one of the solitary bees, and be carried to the home of this bee, and if this does not happen the larva will die. It is because of so many possible failures that the number of eggs laid by a *Meloë* female is enormous. The right kind of bee may not come along, or, as often happens, the *Meloë* larva may fix on to other hairy insects—e.g., flies of different kinds—and so, failing to reach the bee's cell, perishes.

The tiny *Meloë* larvæ, on hatching from the egg and escaping from the soil, swarm up flowering plants—e.g., different kinds of Composites—and shelter among the nectar-producing florets, where, without feeding, they remain motionless, in wait for a host. If the right bee lands on such a flower-head the *Meloë* larva grip on to the hairs of the bee, and are carried to the cell which this solitary bee has already provisioned with honey. Just as the bee lays an egg on the honey—the honey that was destined for the bee's own grub—the *Meloë* larva drops on to the egg. The egg is the only food which will serve the first-stage *Meloë* larva; the larva cannot, at this stage, feed on a honey diet, and indeed would perish if it were placed on the honey. The *Meloë* larva nourishes itself at the expense of the bee's egg, and then, attached to the



Fig. 25.—*Meloë violaceus*.
Natural size. From nature.

empty egg-shell, moults. A new form of larva results, with some resemblance to a chafer-beetle larva, and this second-stage larva feeds on the honey. After a time another moult takes place, the outer skin not being completely moulted off, but remaining to enfold a still different form of larva without functional mouth-parts. This stage of *Meloë* is known as the false pupa stage, from which a third kind of larva develops that goes on to pupation, followed by the exit of an adult *Meloë*. The adult beetles reach the open, and pairing is followed by egg-laying.

THE BACON OR LARDER BEETLE (*Dermestes lardarius*).

In the breaking down of an animal body into a simpler and simpler state there is a more or less regular insect and arachnid fauna which follow in succession from the fresh carcase to the dry sinew and skin. This beetle *Dermestes* (derma=skin), living normally in the open, follows the earlier carrion feeders when these have destroyed the softer parts of an infested carcase; but *Desmestes lardarius*, coming in from the open, has proved destructive in provision stores and larders to ham, bacon, and other stored meats.

The beetle measures up to about a third of an inch in length; it is brown or brown-black in colour, and is rounded in form; the head is small, and the two antennæ are clubbed at the apex; the beetles are pubescent above, and the front half of the wing-covers shows a broad grey band of felt-like hairs running transversely across from one side to the other; three black spots are present on each half of this grey band.

The females lay their eggs on exposed bacon or in cracks and crevices in the food-store. The larvæ that hatch attack the stored food. The larva can be recognised by the long hairs which clothe its body, and by the two spines that project from the last joint of the body. The head is small and horny, and has strong jaws. There are three pairs of short legs.

Where this pest is in numbers the store should be fumigated.

In covering up hams, care should be taken that no chinks are left through which the beetles will lay their eggs.

In infested ham or bacon, attacked parts should be cut away, and the surface washed with a strong solution of salicylate of soda or salicylic acid, or a dilute solution of carbolic acid.

THE PINE RESIN-GALL TORTRIX MOTH (*Retinia* or
Tortrix resinella).

The work of the caterpillars of this moth is common in pines in the centre and north of Scotland, the resin-galls calling attention to the enemy (Fig. 26).



Fig. 26.—Gall of resin following the tunnelling of the Pine Shoot by the caterpillar of *Retinia resinella*.

Natural size From nature

The moth measures up to four-fifths of an inch in length, and about two-thirds of an inch in spread of wings. The head, thorax, and abdomen are brown-grey or slate-coloured. The front wings are dark brown, with glossy or lead-grey

lines and streaks; they have dark-grey fringes. The hind wings are brown-grey, with pale-grey fringes.

The caterpillar measures three-quarters of an inch in length. The colour is yellow-brown, with the head paler. There are sixteen legs.

The moths are found flying in May and June. The females lay their eggs under the whorl of buds of young pines. The caterpillar, on hatching, enters the bark, and bores to the pith. The result is an outflow of resin, which in the same year dries into a hollow gall, the size of a pea or small bean, in which the caterpillar hibernates. Waking up in the next spring, the caterpillar renews its feeding, a fresh outflow of resin resulting in a larger gall. The gall internally shows a partition separating a larger outer chamber from the original gall. The inner chamber contains excrement, while the larva lives in and pupates in the outer chamber. The caterpillar hibernates in the gall a second time, pupating in April of the new year, the adults issuing in May—that is, the generation takes two years for its completion, eggs being laid, say, in May 1921, and the caterpillars from these pupating in April 1923, the moths issuing in May 1923. It has been suggested to me that exceptionally the whole cycle can be completed in one year, but I have no proof of this.

Where attack is not too severe, a swelling below the place of attack may be the only sequel. The main shoot, too, is generally spared, but in over-severe infestation on unhealthy plants in unsuitable soil the buds above the place of attack die. The danger is greatly increased if the Pine Shoot Tortrix Moth (*Retinia* or *Evetria buoliana*) is also at work.

The only possible remedial measure is to collect and destroy the galls, with the enclosed caterpillars. The galls are very prominent in the second autumn.

ENARMONIA DINIANA Gn. (*pinicolana*, L.)

This little moth, first recorded in England in 1846, and then rare, has now spread up to the middle of Scotland. It is a well-known enemy of larch in some parts of Northern Europe and in Alpine districts of Central Europe—*c.g.*, Switzerland. Larch is always named, abroad and at home, as the favourite host plant of the caterpillars, although it has been recorded from pine and spruce on the Continent. I was consulted about a very severe attack by the caterpillars on a young Scots pine plantation, and I report now the salient features of the life-history and damage. I hope to make an intensive study of the pest in summer 1922. The foresters in the district affected have a forty years' experience, and none of them have ever noticed the insect or seen its damage till recently.

The pest passes from district to district. I have records now

of bad attack on six or seven areas, and each attack seems to have worked itself out in six or seven years. The plantations attacked were and are plantations of young Scots Pine. Here



Fig. 27. —*Damage to young Picea excelsa by caterpillars of Enarmonia diniana.*
From nature. Reduced.



Fig. 28. —*Apex of young Sitka Spruce showing attack by caterpillars of Enarmonia diniana.*

Natural size From nature.

and there I found the caterpillars at work on young Norway Spruce (Fig. 27) and on Sitka Spruce (Fig. 28), but not once on Larch. There were very few larch in the plantation, how-

ever, only an odd one here and there ; but though such young larches were completely surrounded by very heavily-infested pines, in no case was the enemy found on the larch.

The moth (Fig. 29) is found in flight from July onwards to September, being in greatest numbers in the last part of July and part of August. It measures about two-fifths of an inch in length and about three-quarters of an inch in spread of wing. The fore-wings are elongated and narrow ; they are pale grey, with brown and slate-grey lines and blotches ; there is considerable variation in colour ; the fringes are grey. The hind-wings are brownish-grey, with light-grey fringes.

The caterpillar, when full grown, measures about half an inch in length. The colour varies somewhat from the young to the fuller-grown stage, the young forms being darker and



Fig 29 *Enarmonia diniana*.
Magnified. From nature.



Fig 30 - *Empty pupal cases of*
Enarmonia diniana.
About 4 times magnified From nature.

the older dirty-green or grey-green. Head, black ; plate on segment behind the head, black ; there are dark stripes down the back, and along each side and beside the lower dark stripe, paler stripes. On the upper surface of the abdominal segments there are four dark blotches or warts, each of which bears a hair, the front pair of the sets of four blotches being squarer than the corresponding hind pair, while their two hairs stand nearer one another. There are other blotches or warts beside the spiracles. An anal plate is present, and dark hairs project from the last segment. There are sixteen legs, black in colour.

The pupa (Fig. 30) is light-brown or chestnut in colour. It has rows of minute backwards-directed spines or hooks, of service, when the adult is ready to issue, in pushing the pupa forward out of its covering. The books state that

pupation takes place in the soil and on the ground among fallen needles and litter. This is sometimes the case, but I have found the pupæ quite commonly at the place of the caterpillar attack on the spun-together young shoots of the pines (Fig. 31).

The moths rest in the day-time, and fly at dusk and at night. They have a quick swirling flight. When moths were disturbed in the day-time by jarring the pines, they soon settled again, their colour harmonising well with their en-

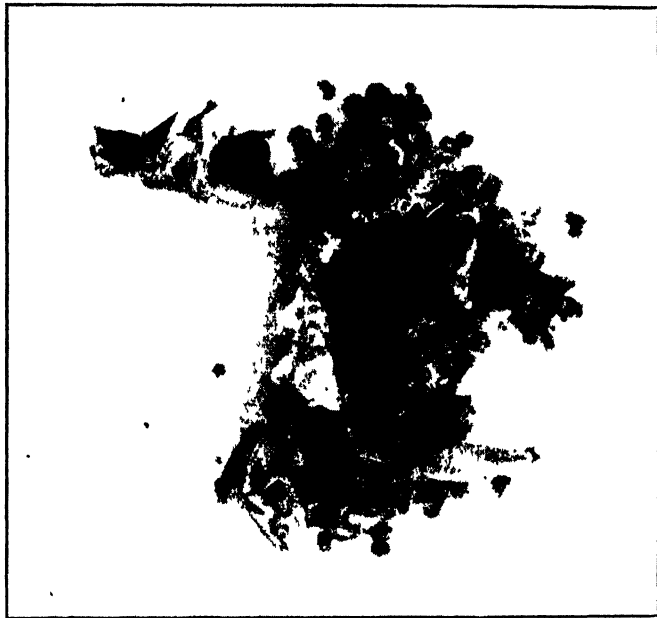


Fig. 31.—Pupa of *Enarmonia dimiana* on pine shoot. The silky covering has been pushed to each side to expose the pupa. Pellets of caterpillar excrement are seen all round about.

Magnified about 3 times From nature.

vironment—an excellent example of camouflage. The caterpillars are said by Barrett to be sluggish, but this is not my experience. When touched the caterpillars would move backwards, and show great annoyance; even without being touched they would, when exposed, lash themselves from side to side. They also drop on a spun thread.

The attacked plantation presented an interesting sight. The whorls of young pine shoots were spun together by silken threads (Fig. 32), and under cover of these the caterpillars were feeding on the needles and on the tender inner sides of the spun-together shoots. Several caterpillars can be found



Fig. 32 — Apex of ten-year-old Scots Pine where leading and lateral shoots show characteristic damage by caterpillars of *Enarmonia dimiana*

From nature Reduced



Fig. 33 — Tips of Scots Pine to show the binding of the shoots together and the excremental pellets of caterpillars of *Enarmonia dimiana*

From nature Reduced

(up to six were so found) in one whorl of spun shoots. The spun-together shoots show quantities of excremental pellets clinging to the silken threads (Fig. 33). A curling of the shoots was often present (Fig. 34). The apices of infested branches were brown or reddish-brown, and where attack was severe this brown withered appearance of the plantation was visible a long way off, contrasting markedly with the green of a healthy pine plantation in the beginning of August.



Fig. 34.—Branch of young Scots Pine showing curvature of shoot as result of attack by the caterpillars of *Enarmonia diniana*. Pellets of excrement are also seen.

Natural size. From nature.

It was surprising to one who had seen this widespread red discolouration in July to find, following some very heavy rains (August 1920), such a marked improvement in appearance. The heavy rains had in many cases separated the spun-together shoots, and as by this time the caterpillars had practically completed their feeding, there was progressive improvement until the end of the season. Right on, however, through the winter signs of the attack remained very evident, and a number of the worst affected plants failed to recover.

The winter is passed in the egg stage. The generation is an annual one, about nine months being passed as egg, a month or over as caterpillar, and three to four weeks as pupa.

THE LARCH SHOOT MOTH (*Argyresthia atmoriella*).

The caterpillars of this Tineid moth tunnel in the shoots of larch. It is less than twenty years ago since the moth was captured in England as a new species. Examples of its destructive work were sent to me from near Oxford in 1906-7. The caterpillars have been found at work in young larch plantations in several places in Scotland—*e.g.*, in Roxburgh and Perthshire. Japanese larch as well as European larch is attacked.

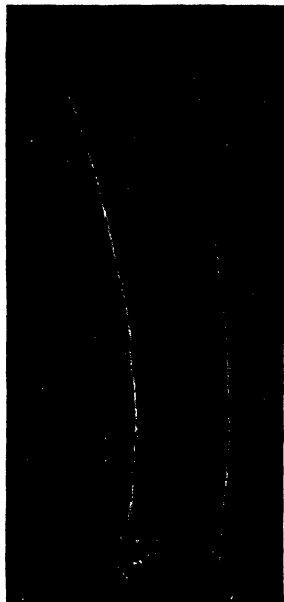


Fig. 35.—Apices of two Larch twigs bare of needles above feeding-place of caterpillar of *Argyresthia atmoriella*.

Natural size. From nature.

The moths are found flying in June about larches. The females lay their eggs on the lower part of the shoot of the year. The caterpillar on hatching enters the shoot, passing through the bark and to the wood. The caterpillar overwinters in its feeding place, and renews its feeding in the next spring. It is now that the damage shows itself. The infested shoot bursts into leaf, and then the needles fall away as the shoot has become quite or nearly ringed by the gnawing of the caterpillar. The full-grown caterpillar, in May, makes a small hole through the bark to the outside, to facilitate the exit of the moth when ready, and covers this with silk. Pupation then takes place, and the moth in due course works its way to the outside through the silk web covering the exit hole.

The upper part of attacked shoots (Fig. 35) bare of needles, calls attention to the enemy.

THE PINE GEOMETER MOTH OR BORDERED WHITE (*Fidonia pinaria*).

I hear of this species almost every year in pine-woods, but there are never complaints of any damage. It is very

different in Central Europe, where periodically this moth appears in overwhelming numbers, and severe damage is done in forests of pine.

There is a distinct difference in appearance between the male and the female (Fig. 36). In the male the ground colour of the wings is white or yellowish-white, but this colour is replaced at the apex of the fore-wings by a large triangular black or brown-black patch, and as both pairs of wings are blackish all round the margin, the male may be described as blackish or brownish, with white or yellow-white areas (the yellow is more characteristic of South of England specimens). The edges of the wings are alternately light and dark. The hind-wings show two dark transverse lines. The antennæ are double-combed.

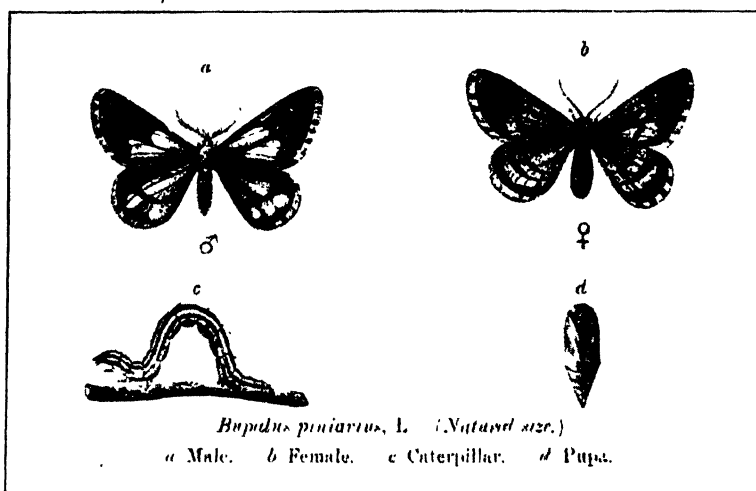


Fig. 36.—Stages in life-history of *Fidonia pinaria* (also known as *Bupalus piniarius*).

After Hess.

In the female both fore and hind wings are rusty-brown, with pale edges. Both pairs of wings show faint, dark, transverse lines. The antennæ are bristle-like. The body is somewhat stouter than that of the male (Fig. 36). The moths fly in the day-time like butterflies, and when they come to rest they hold their wings erected back to back just as butterflies do.

The caterpillar is a looper or Geometer (Fig. 36), with ten legs—viz., three pairs of thoracic legs and two pairs of abdominal legs, one pair on joint nine, and a pair on the last joint. The colour is green, with a white line down the middle of the upper surface, and on each side a dark-green longitudinal line. The spiracles are brown, and below the

spiracles, on each side, runs a pale-yellow line. The full-grown caterpillar measures between an inch and an inch and a quarter.

The females lay their eggs in a row on the inner side of the needles of the Scots pine (Fig. 37). I have found varying

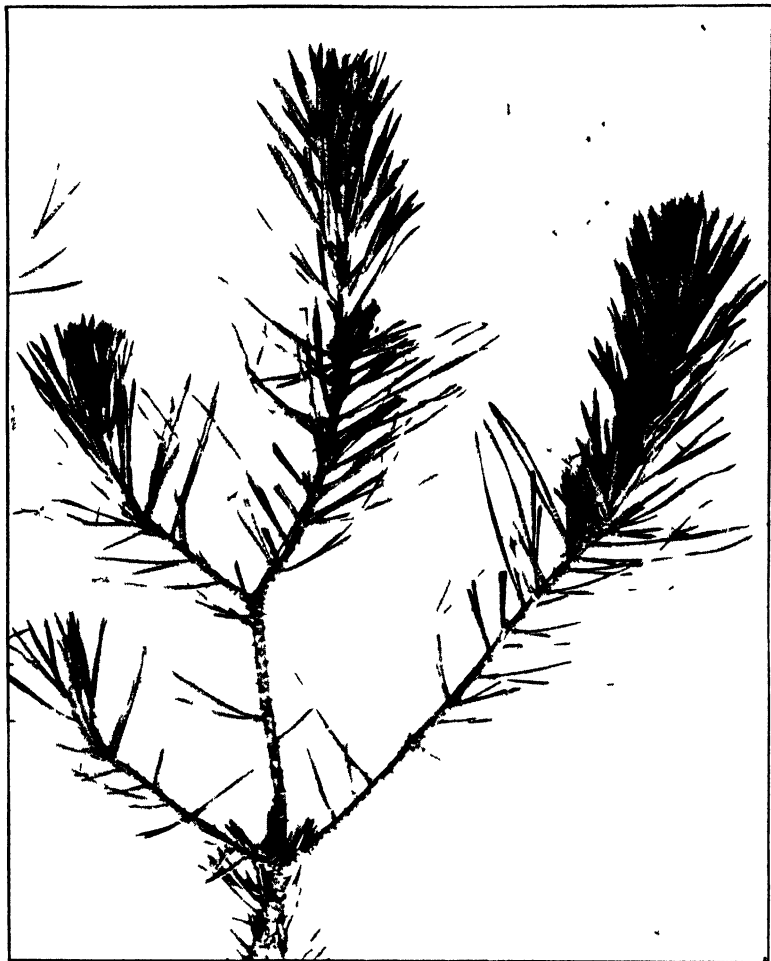


Fig. 37 —Branch of Scots Pine showing damage by caterpillars of *Idionia pinaria*. Here and there eggs can be seen on the needles.

From nature

numbers up to twenty-five, but such a high number on one pine needle is exceptional. The favourite place for egg-laying is the crown of the tree.

In plague years in Central Europe pines may be quite defoliated by the caterpillars (Fig. 38), but in spite of the

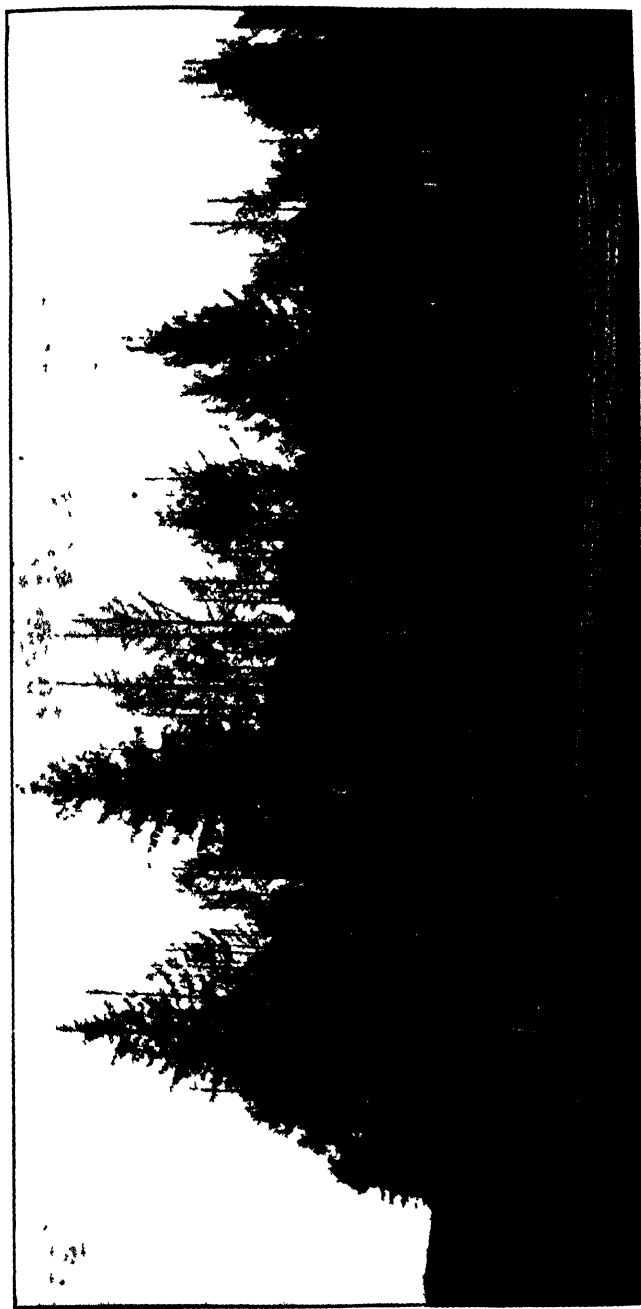


Fig 3. — Portion of Pine forest near Nurnberg defoliated by caterpillars of *Pidonia piniaria* On the left two Spruce trees are seen unharmed
From nature

fact that a conifer has not the same power of recuperation after defoliation as a broad-leaved species of tree, the stripped pines may recover in the next spring, unless there are unfavourable soil and climatic conditions. The chance of recovery is partly due to the fact that the *Fidonia* caterpillars feed comparatively late in the season, and the trees will not have been stripped before autumn; the leaves have therefore had some time to function, and to help towards a reserve that may make recovery possible.

The full-grown caterpillars leave the trees in order to pupate. The pupæ are found in the soil litter or in the surface layers.

The year's round of life is as follows:—

Moths in flight in May and June.

Eggs laid in June.

Caterpillar from July till October.

Pupa, October till the following May.

THE DRONE FLY (*Eristalis*).

Several times during the year larvæ or maggots with long projecting "tail" have been sent to me, taken from liquid containing decaying organic matter and from urine-tanks. They were the larvæ of a species of Drone Fly, the larvæ being popularly known as Rat-tailed Maggots. When the larva is full grown it leaves the water, in order to pupate in soil, as the pupa is not adapted for an aquatic respiration. I placed a number of these full-fed larvæ on soil, in which they buried themselves, and in due course after pupation the adult flies appeared. The species in this case (the larvæ were found in a urine-tank that was kept for manurial purposes) proved to be *Eristalis arbustorum*.

Eristalis larvæ are found in puddles, in liquid mud, and generally in liquid which contains decaying matter. Their appearance in a reservoir, for example, should be looked upon as an unfavourable sign.

The larva is that of a two-winged fly, and its external appearance is such as to distinguish it from all other fly larvæ. The body is round, and bears seven pairs of feet, these being round and provided with hooks. The front pair of feet, close to the head, are flattened out. The body ends in a tail, which is made up of three tubes or sections that can, like a telescope, be elongated or shortened. The section next the hind end of the body is the outer sheath, and has the greatest calibre; the middle joint or sheath slides within this, as it were, and encloses the third tube, whose tip is furnished with setæ or spine-like hairs, which spread out and cling to the surface film. When the tip of this tube is sent to the surface of the water, air is taken in for distribution to the body. The Rat-tailed Maggot can accommodate itself

to varying depths of water. In shallow enough water the larva lies comfortably on the bottom, the respiratory tube or tail being sent just above the surface of the water. In deeper water the telescopic tail is elongated, giving a distance several times as long, it may be, as the larva itself. When the water is still deeper the larva can creep to the surface if a foothold be present, or can float and move at or near the surface, the tail piercing the water to take in air.

The larva subsists upon organic matter or débris in the water or attached to objects in the water. It has a remarkable muscular, sucking and filtering pharynx. Examination of the pharynx reveals two chambers, an upper one leading to the gullet, and separated from a lower one by ribs, which bear fringes of minute barbs. The structure and action are described by Mr J. J. Wilkinson in Miall's 'Aquatic Insects'¹: "As soon as a quantity of particles have been detached from submerged objects by the hooklets round the mouth the larva dilates the upper chamber of its pharynx by means of the attached muscles. Then the water bearing the particles with it rushes into the mouth, and, passing through the lower chamber, is sucked into the upper chamber. The current, as it sweeps past, lifts the fringe of barbules. Then the upper chamber contracts, and the superfluous water escapes by the mouth. In doing so it closes the valve-like fringes. The particles are left clinging to the barbules, and only the filtered water passes out. When a sufficient quantity of food has been collected, the passage into the oesophagus is opened, and the whole mass is swallowed."

One of the common Drone Flies, *Eristalis tenax*, to a non-skilled or careless observer, looks rather like, and can be mistaken for, a bee (bees, however, are four-winged insects, and belong to the quite different order *Hymenoptera*). The old literature of China, Japan, Egypt, Greece, and Rome contains numerous references to the breeding and escape of swarms of bees from the putrefying carcasses of wild animals and oxen. As bees are not really born in such environment, it has been suggested that the insects described as escaping from or swarming round such carcasses, and stated to be bees, were really the Drone Fly (*Eristalis*), which, attracted to a carcass in semi-liquid putrescent state, had laid its eggs, and the larvæ on hatching had developed in the putrefying puddle.

Samson's puzzling riddle to the Philistines—

"Out of the eater came forth meat,
Out of the strong came forth sweetness"²

with its answer—

"What is sweeter than honey?
What is stronger than a lion?"

¹ Miall: 'Natural History of Aquatic Insects,' page 209. (Macmillan & Co.)

is sometimes referred to in this connection as related to the belief named above. As Samson ate of the honey, however, and Drone Flies do not make stores of honey, the explanation offered in this case is that the carcase of the young lion killed by Samson had, baked by the Eastern sun, become so dry and hard as to afford a shelter-place that had attracted a swarm of wild bees. This is not impossible, and is there not a Greek story of bees using the empty skull of some malefactor as a hive?

THE CLEG (*Hæmatopota pluvialis*).

This narrow, half-inch-long fly, with the speckled wings and the wonderfully-coloured (when the insect is alive) eyes, is well known from its attacks on men and horses, and is specially prevalent in the neighbourhood of woods and marshes. It is the female which punctures the skin for a meal of blood. The mouth parts are well fitted for their piercing work: six parts of the mouth apparatus—two dagger-like, two like lancets, and two with minute saw-like edge—lie in a fleshy labium. The male mouth parts are less formidable, as the males nourish themselves on honey and honey-dew and plant juices. The Cleg belongs to the family *Tabanidæ* or Gad Flies, which are often confused with another family, *Æstridæ*, the Warble or Bot Flies. The flies of both families cause stock to run about the fields, but the families are easily distinguishable in this, that the *Tabanids* have formidable mouth parts, while the *Æstrids* have mouth parts rudimentary or absent. The adult *Tabanids* pierce the skin and suck up the blood, while the adult *Æstrids* do not know the pleasure of a meal. The larvæ of the Cleg and other *Tabanids* have no relation whatever to stock, but live in wet soil or in water, while the larvæ of *Æstrids* are parasitic on stock, in the alimentary canal (Horse Bot) or under the skin (Ox Warble) or in the nostril (Sheep Nostril Fly).

It is difficult to protect horses for any length of time against the Cleg and other blood-sucking flies. Certain dressings that are practicable serve as protectives as long as their odour persists, but this is as a rule not long. I therefore quote the advice of a correspondent in 'Country Life' for 13th September 1919, and will be glad to hear the result from any of our members who may give it a trial. "A few drops of oil of white birch touched by the finger on a hat or ribbon, or on a rag tucked in a hat-band, will prevent flies and midges from coming near. Personally this last summer I have relieved several horses tortured by flies by putting a drop or two on their ears and about the harness. In one minute the horse was at perfect rest."

OLIGOTROPHUS (*Cecidomyia*) TAXI.

The *Cecidomyiids* are short-lived, minute, two-winged flies with long antennæ. The wings are broad for their length, and have only a few longitudinal veins. The larvæ are small legless maggots, composed of a head and thirteen following segments. The head is only poorly developed, and the mouth parts are rudimentary. Very characteristic (under the microscope) is the "breast bone" or "anchor plate," a horny structure found on the under surface of the first true thoracic joint. The function of this structure is in doubt; it is perhaps of service in movements or in feeding. The colour of the larvæ is white or yellow-white, pink, red. Many of the species give rise to galls. One of them is the cause of a gall on

Fig. 39 — Galls of *Oligotrophus taxi*

From nature Reduced

the yew (Fig. 39). The gall is found at the tip of the shoot, and consists of a number of shortened leaves that suggest a small cone, and may become rosette-like. The inner leaves of the cone-shaped gall are yellowish, and the outer ones may be a shade lighter than normal leaves of the yew. Only one larva is found to each gall. Pupation takes place in the gall, and the adult fly issues in June.

THE SOCIAL WASPS.

There is great difference of opinion and some lack of knowledge as to the true habits of the social wasps and their economic importance. It is true that wasps may often be a nuisance and sometimes even dangerous, and that they can be very destructive to ripe fruit, but this is not the whole of the truth, for the grubs of wasps are carnivorous and are fed on

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From nature. Reduced

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flies—*e.g.*, bluebottles and even daddy-longlegs, small caterpillars and green-fly, thousands of which for one nest alone are caught as prey by the worker wasps. Wasps also are of some service in the pollination of flowers.

Of the seven British Social Wasps, six are found in Scotland; the seventh—the largest of the wasps—*Vespa crabro*, the Hornet, requiring verification as a Scottish insect. Of our six Social Wasps, only five make nests for themselves, the remaining one, *Vespa austriaca*, being regarded by some as a different form of *Vespa rufa*, and by others as a cuckoo in the nest of *Vespa rufa*. *Vespa rufa* is the quietest or best-tempered of the wasps. Its nest is typically in the ground. *Vespa norvegica*, perhaps the shortest-tempered of our wasps, is one of the tree or bush wasps. The nest is made of wasp-paper, arranged in sheets or strips or bands more or less parallel to one another. We have seen fine examples hanging from gooseberry bushes in Perthshire. *Vespa sylvestris* is another species typically with above-ground nest hanging from a tree, and recognisable often by neat rounded or bell-shaped symmetry (there is variation in position of nest of all the wasps).

The remaining two wasps, *Vespa vulgaris* and *Vespa germanica*, are the commonest of our wasps, and both are typically underground forms, whose nests show a shell-like pattern externally, the “shells” having a more rounded appearance in *vulgaris* and a flatter appearance in *germanica*.

Three castes are reared (except in *Vespa austriaca*) in the nest of a Social Wasp—viz., males, queens, workers (non-fertile females). At the end of the season all the members of the nest or colony die except the young queens reared during the season. These young queens, having been fertilised by the males or drones, leave the nest, and search out a shelter-place, where they pass the winter in a dormant condition. In the next spring (April and May) the young queens issue from their place of hibernation. Each queen that has hibernated is the potential founder of a new colony. She seeks a suitable place for a nest, and having chosen a place lays the foundation of a nest, and then makes a comb, consisting of two dozen or so cells. In each cell she lays an egg, and when the grubs hatch out the queen acts as huntress and purveyor of food and as nurse. The grubs moult several times, and on becoming full grown pupate, the adult wasps being ready in a month to six weeks from the laying of the eggs. All the earliest issuing adults are workers, and as these and new workers are reared the queen is relieved of some of her responsibility. The workers do the foraging and the hunting; the queen devotes herself to the laying of eggs and the superintendence of the indoor economy of the nest. As the population of the nest increases, new floors or combs of cells

are added, each new floor being supported by buttresses or pillars of wasp-paper hanging from the previous one. A space is left between comb and comb sufficient to allow of the free movement of the wasps. To accommodate the increasing size of nest, excavations in the case of a ground species may have to be made, and one may see the workers carrying out pieces of soil three and four times as heavy as the wasp itself. The working day may sometimes be an eighteen hours' one.

As the season runs on males or drones (these arise from unfertilised eggs) are produced, and perfect females or queens. These young queens, after being fertilised by the drones, look out for hibernating quarters. The colony falls off in numbers, food gets so scarce that the workers may feed on the last grubs, and then gradually the whole colony perishes. During the season cells in which grubs have been reared to the adult condition may be partially cleaned out and used again, as often as three times. Twenty to forty thousand (sometimes more) wasps may have been reared from a very strong nest in the course of a season; smaller numbers are commoner.

One distinction between the grub of a Social Bee and the grub of a Social Wasp is that the bee grubs are nourished on pollen and honey, whereas wasp grubs are carnivorous. Mr W. F. Denning, studying wasps intensively, wrote to 'Nature'¹ as follows: "Wasps kill an enormous number of flies of all kinds. I found that the members of a comparatively small nest of *Vespa germanica* in 1913 brought home at least 2000 flies per day. A very strong nest would account for twelve times as many." While it is impossible not to recognise this useful work of wasps, which may further play the part of scavengers on carrion, it is admitted that they are harmful to fruit, and that their stinging habits (the males are without stings) render them a source of worry and danger. Specially dangerous is a sting in the mouth or throat, the wasp having gained entry unnoticed or concealed in fruit.

If wasps have to be fought, then the queens can be collected, each queen being the potential foundress of a nest; and yet when one reads of the prizes given for large numbers of killed queen wasps, one cannot help also wondering what insect plague might follow the annihilation of the wasp. Or a proportion of the nests could be destroyed.

To destroy a wasp nest a small ladleful of melted tar emptied into the entrance-hole of an underground species is effective. So also is the pouring in of some paraffin. A plug of cotton wool soaked in bisulphide of carbon (the fumes are poisonous, and the vapour is explosive in the presence of a light of any kind) and pushed into the opening of the nest is effective

¹ 'Nature,' 13.5.20.

against both underground and tree nests. Equally effective is cyanide of potassium (a very dangerous poison), a solid piece of which rolled in a plug of cotton-wool and introduced into the entrance-hole of the nest will destroy the inmates; or a plug of cotton-wool soaked in a solution of cyanide of potassium (one ounce to a pint of warm water). Paraffin emptied on to the top of a hanging nest has also proved successful; it soaks into the nest.

In the case of wasps damaging fruit, most are familiar with the plan of trapping the wasps in lures of sweetened beer or sweetened water.

WOOD WASPS (*Siricidæ*).

Several times during the year the Giant Wood Wasp, both as adult and as larva, came for determination. The females of the Giant Wood Wasp (*Sirex gigas*) are easily recognised by the boring egg-laying tube projecting beyond the hind end of the body (Fig. 40). From the tip of the abdomen, above the ovipositor, a short spine also projects. The female varies in size up to $1\frac{3}{4}$ inch; head and thorax, black; antennae, two spots behind the eyes, and the feet, yellow; abdomen, yellow, with dark transverse bands on joints two to five. The Giant Wood



Fig. 40. — End of abdomen of female *Sirex gigas*, showing spine and ovipositor.
Natural size From nature

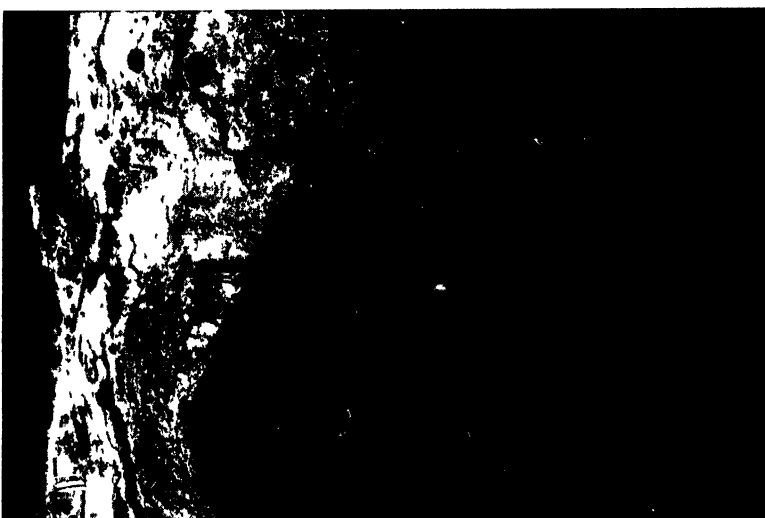


Fig. 41 — Flight holes of *Sirex gigas* on Japanese Larch.

From nature.

Wasp chooses spruce as its favourite tree for egg-laying purposes, sometimes also silver fir, more rarely pine and larch. In Perthshire the larvæ have also been taken in Douglas fir and Japanese larch (Fig. 41). Sickly suppressed standing trees are used for brood purposes, but eggs are laid freely in broken, blown, and felled timber. Felled or blown trunks should not be left lying in the woods, as they become centres from which new broods of wood wasps pass to standing trees.

The larvæ tunnel in the solid wood of trees; they are white or yellow-white grubs, with rounded bodies and small horny heads, provided with strong gnawing jaws. The thorax carries three pairs of stunted thoracic legs, and the body ends in a horny spine.

CHERMES COOLEYI.

In the 'Transactions' for 1919 I gave a full account of the biology of the *Chermes* of Spruce and Larch, pointing out that two host plants of different species were required for the



Fig. 12. *Chermes cooleyï* on Douglas Fir in Perthshire.

From nature Reduced

complete life-cycle of the insect, this cycle taking two years to complete, and five different generations being represented.

Chermes cooleyï is a North American species, which has been introduced in commerce into Great Britain. The Forestry

Commission have been engaged over the problem of the spread of and possible damage by this insect. In Canada the primary host is Sitka spruce, and the intermediate host is Douglas fir. These are both trees of great importance at present in British forestry, and the Report of the *Chermes cooleyi* work on such trees in Britain is being awaited with interest. In Scotland *Chermes cooleyi* has been found on the Oregon Douglas fir (*Pseudotsuga douglasii*, Carr) in Peeblesshire and in Perthshire. Fig. 42 is a photograph of one of my Perthshire specimens. The insects are in the Colonial stage (see 'Transactions' for 1919).

THE WOOLLY APHIS OF APPLE (*Schizoneura* or *Eriosoma lanigera*).

This exceedingly harmful aphid, so common in old orchards where the oversight is slack, and on old neglected lichen or moss-covered trees, is recognisable by the tufts of woolly-looking material that cover the insect. The "wool" is really

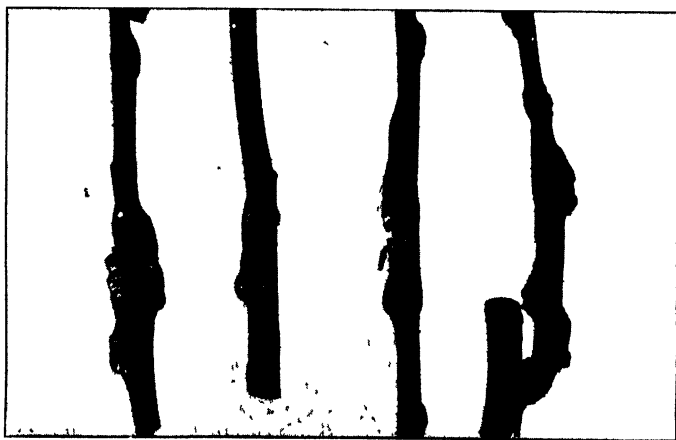


Fig. 43.—Prunings from Apple showing cankered swollen areas infested by Woolly Aphis.

From nature. Reduced

wax, which is given out from wax pores that stud the upper surface of the body, and also from the cornicles behind the fifth and sixth segments of the abdomen. These cornicles do not stand out as distinct projections in the way they do in so many aphids, but their ring-like opening is almost flush with the chitin of the back. The wax given out from the openings of the cornicles is yellowish in colour, that given off through the wax pores being bluish-white.

All varieties of apple grown in Britain are subject to the attack of this insect. Owing to the wounding of the external tissues and the draining away of the sap by the introduced mouth parts of the insect, large swellings and canker-like cracks show on branch and stem (Figs. 43, 44, and 45). These canker-like cracks afford shelter places for the pests, protecting them from the reach of insecticides. It is important to note that the Woolly Aphis also attacks the roots. There is a migration from above to the roots and from the roots to above-ground parts. It is partly because of this migration from the roots that trees which to all appearance look clean after treatment may show quite bad infestation again. No treatment of the tree is satisfactory which neglects the root-infesting form.



Fig 14 —Canker like swelling on Apple branch due to Woolly Aphis.



Fig 15 Part of branch of Apple. The swellings are due to Woolly Aphis
One third natural size From nature

Various forms of *Eriosoma lanigera* are to be found on the apple-trees during the year, and there may be—in America it has been clearly proved—in our country a migration to the elm-tree in autumn, with a return to the apple in summer

Taking first what happens most commonly in Britain, the winter is passed in the wingless viviparous stage, these wingless females sheltering in cracks in the bark or under cover of lichenous growth. After hibernation these give rise to live young—i.e., to another wingless female generation—and this kind of multiplication may continue for a number of generations, or somewhere in the cycle winged viviparous females are produced which may spread the infection to other apple-trees, and so on to the sheltering winter generation. In the life-cycle just outlined no males appear, but sometimes—though the records of this are rare—towards the end of the season males are developed, and these mate with females. A fertilised female lays one egg, and the winter is passed in this stage. In the following spring the egg hatches. The adults developed from such eggs are all wingless females, each the progenitor of a new series of wingless and winged virgin females.

In the United States, where this insect is also a pest, Patch and Baker have shown that the life-history is more complicated, two host-trees—elm and apple—being made use of for the completion of the life-cycle. In autumn a fertilised egg is laid in a shelter place on the bark of elm; the winter is passed in this egg stage. In the succeeding late spring the egg hatches, and a young foundress results, which lives under cover of the opening-out elm leaves. The leaves of elm curl as a result of the sucking work of the foundress, which under cover of the curled leaves gives rise to live young. After more than one generation of wingless viviparous females, winged females are produced, and these migrate from the elm to the apple, and there produce a generation of wingless females. These wingless forms produce in turn another wingless generation, and stem and branches and roots receive infection. In autumn a winged generation develops—still all females—and these winged females, or many of them, fly back to elm, on whose bark they give rise to a new generation—some males, some females, the only time in the life-cycle when the two sexes are found. These males and females are very minute in size, and have no functional mouth parts. Pairing takes place, and one fertilised egg is laid in a shelter place in the bark of elm, the egg with which we began this complex life-history. Theobald, in the south of England, has found an elm form, curling the leaves of elm, that he cannot distinguish from the winged apple form.

Treatment.—(1) Spray trees in winter with a winter wash to remove moss and lichen and to destroy wintering females—e.g., 2 to 2½ lb. of caustic soda dissolved in 10 gallons of water, as recommended in Leaflet 34 of the Board of Agriculture and

Fisheries,¹ or else Pickering's Woburn Winter Wash, the formula of which is:—

Iron sulphate	$\frac{1}{2}$ lb.
Lime	$\frac{1}{4}$ lb.
Caustic soda	2 lb.
Paraffin (solar distillate)	5 pints.
Water to make	50 gallons.

How to prepare the wash: Dissolve the iron sulphate in about 9 gallons of water. Shake the lime in a little water, stirring well, and adding more water to make a "milk." Next run this milk of lime into the iron sulphate solution through a piece of sacking or a fine sieve, to remove grit or coarse particles. Now add the paraffin, and churn thoroughly. Just before using, add the caustic soda in a powdered form.

Note: *a.* This wash must be applied only to trees that are dormant.

b. The sprayer's face and hands need protection.

c. A caustic wash should not be an annual measure; such caustic washes in time affect the health of the tree.

(2) The summer stages of the Woolly Aphis are destroyed by a spray of nicotine and soft soap, but it should be remembered in such spraying that their waxy covering is a protection, therefore the spraying must be thorough. Theobald gives the formula:—

Nicotine sulphate	1 oz.
Soft soap	4 oz.
Water	10 gallons.

(3) Be on the outlook for infection in the early stage. Destruction of the aphid is not nearly so difficult if the pest be fought when it first shows itself. The aphid has to be looked for by regular inspection of the orchard or tree. At this time, with young plants, hand treatment by methylated spirit is advised. The methylated spirit should be well brushed into the attacked regions.

(4) The Woolly Aphis gets shelter in cracks and on parts that have been pruned or wounded. When large branches are cut away, cover the wound with Stockholm tar as a preventive measure.

(5) The pest is spread on nursery stock, which before planting should be examined, and fumigated if necessary, with hydrocyanic acid gas,² or dipped in the nicotine-soft-soap solution named above.

¹ Leaflet No. 70 describes Winter Washing.

² See Board of Agriculture and Fisheries Leaflet No. 31.

(6) Against the root-infesting form the best treatment is fumigation with bisulphide of carbon.¹ This should be injected into the soil in four places, about two feet away from the trunk of the apple-tree. For each injection one fluid ounce of bisulphide of carbon is sufficient for a good-sized tree. The liquid bisulphide of carbon must not touch the roots, else these will be injured. The bisulphide of carbon vaporises readily; the vapour—harmless to the roots—kills the insects

THE GREENHOUSE WHITE FLY (*Asterochiton* (*Aleyrodes*)
vaporariorum).

This troublesome greenhouse pest came to me from Aberdeenshire, where it was doing destructive work on tomatoes. The damage is due to two causes: the mouth parts of the insect pierce the leaves, and sap is drained away, resulting in a partial spoiling and withering; and secondly, and even more important, the insects give out quantities of a sticky sweet stuff which clogs the leaves, and affords an excellent growing ground for several kinds of fungi. Such leaves are unable to breathe and transpire and manufacture food, and the infested plant dies off.

The Greenhouse White Fly is related to aphids and scale insects, and is a member of the same order, *Rhyncota*, and the same sub-order, *Homoptera*. The family name for the White Flies is *Aleyrodidae*. The adults are minute four-winged insects, covered with a secretion of wax, which gives them a white appearance. They look like tiny white moths, and are commonly known as white flies or snow flies, or sometimes as ghost flies. These insects are found indoors in heated greenhouses, out of doors in cold frames, and also in the open air. We have no experimental or observational records as to their ability to endure the open-air temperatures in the north of Scotland, but in the south of England it is possible that they can survive a mild winter in the open. The adults and the eggs are more resistant to unfavourable environment than the other stages of the insect. Eggs on leaves that dry on separation from a plant fail to hatch, and the presence of fresh leaves for feeding purposes is a condition for the life of the adult, a fact which limits its life in unfavourable out-of-door temperature. Work has been done on this insect in Britain by Mr Hargreaves,² and a very exhaustive and very helpful paper, practically, has just been published by Dr L. Lloyd,³ whose work, especially on methods of control, I shall summarise here for our members.

¹ See Board of Agriculture and Fisheries Leaflet No 188, and my notes on Bisulphide of Carbon in the 'Transactions' for 1918.

² 'Annals of Applied Biology,' Nos 3 and 4, 1915.

³ "The Control of the Greenhouse White Fly (*Asterochiton vaporariorum*), with notes on its Biology." 'The Annals of Applied Biology,' vol. 12., No 1

After pairing, the females proceed to lay their eggs. The eggs are laid in circles on smooth leaves, but on hairy leaves, like those of the tomato, they are more scattered. They are laid on the underside of the leaf. Each egg has a short stalk, which, caught in a cut in the leaf, holds the egg in position. The eggs are dusted all over with wax from the bodies of the parent. The eggs from fertilised females yield larvæ that develop some into males, some into females; but unfertilised eggs from virgin females can also hatch. There are experimental records indicating that the adults reared from virgin eggs are always males, and others indicating that virgin eggs give rise to females. Interesting biological points are involved here outwith the purpose of this review.

The length of time taken for the eggs to hatch varies greatly—from a fortnight in heated tomato houses to four months in varying out-of-door temperatures. From the egg issues a six-legged larva, with ability but little inclination to move; it moves only a very short space from its place of hatching, and sinking its mouth bristles proceeds to feed. Two moults take place at short intervals, the insects being now quite stationary, and then after a third moult a stage is reached where the secretion of wax is so copious that the insect is quite covered, the piercing proboscis only being visible through an opening on the under surface towards the front end. Two openings, under cover of porous wax, on the thorax and one behind, allow the entry and exit of air for breathing. Under this opaque covering of wax the insect perfects and attains its adult appearance, and in due course a male or a female issues.

The length of a complete cycle varies with the conditions, including the species of food plant; in warm weather, in Lloyd's experiments, in a greenhouse, the adults issued in three weeks to a month from the time of hatching of the eggs, whereas in cool weather in spring and autumn the time taken was from over a month to a month and a half. The insect feeds in all stages of its development.

Lloyd, researching in the Experimental Station, Cheshunt, and writing of the Lea Valley and the south of England, has found that this White Fly has a wide range of food plants, those suiting it best having rather thick sappy leaves.¹ "Among the hosts favourable to this White Fly may be mentioned: tomato, potato, cucumber, vegetable marrow, French beans, tobacco, hollyhock, calceolaria, dahlia, heliotrope, stinging-nettle. On these plants practically every egg laid produces an adult under favourable circumstances. On a number of hard-leaved plants it can breed successfully, but the mortality of the larvæ is great, and the plants do not frequently become massively infested. Such plants are the

¹ Dr Lloyd in 'Annals of Applied Biology,' vol. ix., No. 1.

grape vine, various fuchsias, Calla, begonias, geraniums. On the younger foliage of the tuberous begonias none of the insects survived the first moult, and on the older leaves the insects at the extreme periphery alone reached maturity. On chrysanthemums breeding was free on old foliage, but not common on young growth. On two weeds strongly favoured by the adults—Bittersweet (*Solanum dulcamara*) and Purple Dead-nettle (*Lamium purpureum*)—no White Fly was ever found to mature, all dying either before or just after the first moult. On narcissus, tulip, hyacinth, and various grasses eggs were often laid, but no larvæ passed the first moult. Mature insects have been found rarely on elder and hawthorn, and rather frequently on elm. This list by no means exhausts the food plants of the insect which were noted, but is merely indicative of its range."

The cucumber is another host plant, but the higher temperatures of cucumber houses disfavour the White Fly, which is not included among the pests on this plant.

The foregoing list of plants is of importance to the grower of tomatoes, not only because the wide range of host plants emphasises the possibilities of infection and the difficulties of control, but it indicates conditions under which the White Fly does its worst work. If, where the White Fly thrives in the open, the grower grow tomatoes only, clearing out his houses in winter, and leaving them free of weed and other plants, then infestation will not happen on his plants until the White Fly begins to show activity outside, and enters the houses, say, at the end of May and in June; thus it will be well on in the summer before the insect can be in numbers enough to do much harm. On the other hand, where in the houses there are other plants all the year round, then the White Fly may, even in the absence of tomatoes, always be present in the houses. From these other plants infection passes to the young tomato plants, with possible very unhappy results, as the pest gets an early start and continues to get worse.

CONTROL OF WHITE FLY.

Do not introduce the pest on young plants already infested; and do not, in localities where outside temperature favours the insect, bed out plants that are not clear of White Fly infestation.

Spraying operations against the White Fly are very likely to fail, owing to the difficulty of reaching the insects under their covering of wax. The best results come from fumigation. Lloyd specially experimented with naphthalene, tetrachlorethane, tobacco, hydrocyanic acid gas, and I summarise his results.

Naphthalene. This is a well-known insecticide, frequently used against White Fly. It can be bought in various forms under different trade names. Some of the forms of naphthalene are useless as fumigants against White Fly; the most useful form is that containing a considerable residue of tarry acids. The amount of the tarry acid present varies, and cannot be guaranteed, and as there are additional risks to the tomato fruits, Lloyd rules naphthalene out as a poor remedy.

Tetrachlorethane. This is a poisonous liquid which is just poured down the centre of the tomato-house in the evening at the rate of half a pint of tetrachlorethane to 1000 cubic feet. The house is then closed, and the longer it can be kept closed the better. The tetrachlorethane vaporises. While not extremely dangerous to human beings, workers should not remain in houses that are being fumigated with tetrachlorethane; they should only enter them to open ventilators. If the tomato-house can be kept closed for the succeeding day and night the adult White Fly and all other stages except the eggs will be killed. Further fumigation is therefore necessary on the hatching of the eggs, say, in a fortnight in summer, or three weeks in spring or autumn. Some greenhouse plants, but not the tomato plant, suffer from the tetrachlorethane vapour. This fumigant is too dear for use on a trade scale, but is excellent and practicable on a small greenhouse scale. In a lecture on White Fly, a copy of which Dr Lloyd was kind enough to send to me, he says: "We kept a very good control over the pest last year in one of our tomato-houses (4500 cubic feet) by means of two fumigations with tetrachlorethane at an approximate cost of nine shillings."

Tobacco. Experiments with various tobacco preparations did not yield favourable results. The cost, too, to the commercial grower is also against them.

Cyaniding. This is fumigation with hydrocyanic acid gas. It is a cheap and effective method, and is the best for trade nurseries. The material used is sodium cyanide (high-grade 98 per cent purity), and the gas is generated by sulphuric acid. The proportions given by Lloyd are: 1 oz. sodium cyanide, 1½ oz. fluid sulphuric acid diluted with 3 oz. of water (*i.e.*, before use the acid is diluted with twice its volume of water). *The gas evolved is a most dangerous gas to human life*, and the fumigation should only be done by some expert who knows the risk. Further, the gas can also be very destructive to plants, unless certain conditions are attended to, as well as having the correct proportions of sodium cyanide, sulphuric acid, and water. The lower the temperature at which the fumigation is done (under 60° F.) the less likely are plants to be injured; and specially fumigation must not take place until the sun has set. Further, fumigation should not take

place when the plants are turgid with water, but when the roots are as dry as they dare be. "The fumigation may be given the night before the periodical watering is due, or when the soil in the pots is dry. The day after the fumigation the plants may be watered freely." The house fumigated must be opened before dawn. The dosage recommended after much experiment is, "for an isolated greenhouse in a moderate state of repair, $\frac{1}{4}$ oz. of cyanide for 1000 cubic feet; in a block of greenhouses, in decent repair, which communicate with one another, $\frac{1}{4}$ oz. per 1000 cubic feet is a sufficient quantity; or when the houses are new and in very good repair so that there is no leakage, $\frac{1}{6}$ oz. per 1000 cubic feet." "The amount of cyanide which should be put into one jar depends on the width of the house to be treated. A good rule is so to arrange the jars that the distance between two is approximately the width of the house." The gas kills all stages but the eggs; therefore a second fumigation is necessary, say, in ten days to a fortnight in summer, and in spring and autumn from the twenty-second to the twenty-eighth day.

Lloyd's golden rules for cyaniding are:—

Do not fumigate before sunset.

Open up about dawn.

Do not put the cyanide into the acid in paper packets.

Mix the acid correctly.

Measure the house correctly.

Have the house cold.

Have the roots of the plants as dry as may be without harming them.

MANGE OR SCAB PASSING FROM HORSE TO MAN AS A SERIOUS INFECTION.

In the cases referred to below, the mange the horses were suffering from was Sarcoptic Mange. This mange is due to the mite *Sarcoptes scabiei*, var. *equi*. This mange mite has a rounded body, greyish in colour, sometimes with a slight tinge of red. On the shoulders of the mite, under a high magnification with the microscope, very short cone-like projections are visible; on the back are minute scales, with their points backwardly directed, and there are small thorns on each side of the rump. The male measures about $\frac{1}{16}$ th of an inch in length, and the female up to $\frac{1}{8}$ th of an inch. Of the four pairs of legs in the adult male, one, two, and four have on the last joint a stalk terminated by a sucker; each of the third pair of legs ends in a long hair, and no stalk or sucker is present. In the female the front two pairs of legs have the stalk and sucker; the two hind pairs of legs end in a long hair.

This mange mite differs only slightly in appearance from the

Sarcoptes scabiei of man (Fig. 46), the chief difference being that the scales mentioned above as on the back are in the *Sarcoptes* of human beings perceptibly longer than their breadth.

The female *Sarcoptes* of the horse makes a mine in the skin, the mine being dug out by her mouth parts. She moves always forward, as the scales and spines on her body prevent a backward movement. In her wake in the gallery, excrement can be seen and eggs in different stages of development. At the front end of her gallery the female herself can be found

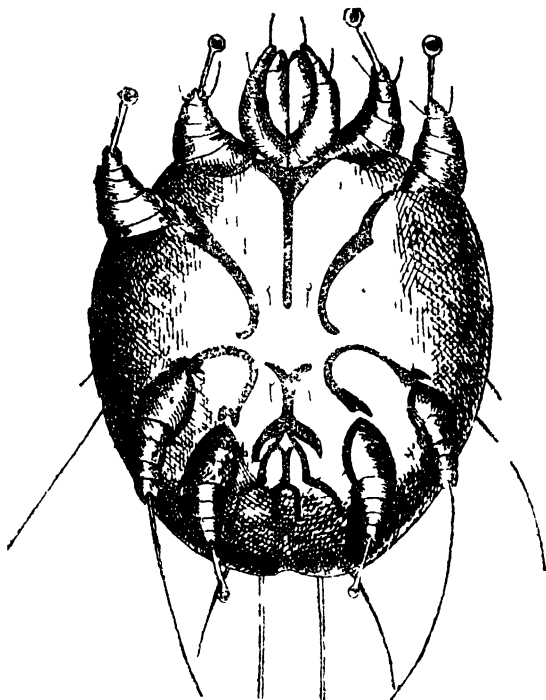


Fig. 46 — *Sarcoptes scabiei*

Greatly magnified (After Lohmann in Dis Tenrich)

by careful search ; in the case of the *Sarcoptes* from man a very expert worker may follow up the female and pick her out from the end of her burrow on the point of a needle, to which the mite may cling by aid of the suckers on the legs.

From the egg hatches a larva that resembles the adult in general form, but only six legs are present. The larva pierces its way to the outside of the skin through the roof of the mother gallery, and after several moults reaches the nymph stage, when eight legs are present. The nymph develops

sexual organs, and the adult stage is attained—mature males and females. Pairing takes place on the surface of the skin. The fertilised female then burrows into the skin to lay her eggs, a new cycle being started.

The *Sarcopt* of the horse passes readily to the ass and the mule. It is also transmissible to man. The teaching on the whole up till now has been that the disease on man following infection from a horse is not severe, and yields readily to treatment. The cases recorded below, both of them from first-hand knowledge of the cases, prove that the consequence to man of an infection from the horse can be severe, and emphasise the wisdom not only of taking care in the event of handling a horse suffering from mange, but also of taking advice immediately the sufferer suspects infection. No treatment of an affected horse can be considered satisfactory which neglects the great risk of infection. The disease spreads readily from horse to horse; therefore infested animals should be isolated. When the horses are clipped, small pieces of crust fall away with the hair, and both hair and crust probably harbour the mites; therefore there should follow a sweeping together and a burning of the removed hair and crusts. Before sweeping it is a good plan to disinfect by spraying with paraffin emulsion or a 4 per cent solution of carbolic acid. Stalls, litter, harness, and articles used about the animal should be carefully disinfected. A painter's flare may be used in this work. Brushes, curry-combs, and clippers should be dipped in paraffin emulsion after they have been used; harness should be scrubbed in a 3 per cent solution of creolin.

The worker with an affected animal should very thoroughly wash his hands in soap and hot water, and where he has had to dress a badly-infested animal the extra trouble of taking some sulphur ointment and washing the hands with it, specially rubbing the fingers together so as to get into the spaces between them, is well worth while.

The first case I will mention is that of an enthusiast who treated a horse where the mange was of some standing. The treatment as regards the horse followed the usual lines, and the horse was eventually cured. About a week after commencing with the case some red spots began to show on the wrist of the worker. These began to spread, and intense itching followed. The irritation, so characteristic of scabies, followed by itching, is probably in part due to the introduction of a toxin of some kind by the mite. The human patient cannot help scratching to relieve the intolerable discomfort, and so the hands get easily infected.

In the case of the patient at present under review infection spread over considerable areas of the body. The patient, shy of taking anybody into his confidence as to his ailment, had a most miserable time, and endured much and for a pro-

longed period before a cure was effected. The mange mite on examination proved to be the *Sarcopt* of the horse.

In a second case, last early spring six or eight men had been in contact with a horse suffering from Sarcoptic Mange. Every one of them—all quite without suspicion of any harm—became infected. I was made acquainted with their case by the various sufferers, examined the mites, and verified the mites as *Sarcoptes* of the horse. One of the affected patients kindly gave me a note of his case, whose course was as follows :—

Contact with the horse took place on a Saturday. On the Sunday evening, while sitting in front of the fire, the patient became aware of a slight irritation between two fingers, and on examination of the hands each interdigital space was found to be the site of a small reddened area about the size of a pin head. On the Monday morning the patient was awakened by an intense itching in arms and legs, and lesions resembling those between his fingers were now found all over the body, with the exception of the face. The patient, now suspecting what was the matter (the other contacts were in resembling though not in so severe condition), was subjected to thorough treatment, and the result was a recovery followed immediately by an outbreak on the back and sides of the hands of little swellings, non-irritant, but each containing a small quantity of colourless serum. Special treatment for this was prescribed, but it took another fortnight before recovery was complete.

THE RELATIONSHIP BETWEEN CITRIC SOLUBILITY OF PHOSPHATES AND YIELD OF TURNIP CROP.

By J. F. TOCHER, D.Sc., F.I.C., Consulting Chemist to the Society.

THE writer has made a preliminary study of the degrees of citric solubility of mineral phosphate and other phosphatic fertilisers, the detailed results of which are embodied in a paper contributed to the 'Journal of Agricultural Science.'¹ In view of the results obtained, it was considered desirable to test the effects of various phosphatic fertilisers on yield of turnip crop, keeping in view the degrees of citric solubility of these fertilisers and their unequal phosphatic content. At the same time the effect of fineness of grinding of mineral phosphate was studied. The results are believed to be of practical value to farmers, but field trials on various soils on a large scale are necessary to furnish similar data for analysis by modern statistical methods. It is important to know by these precise methods whether slag phosphate produces better results than mineral phosphate. The results obtained in the field trials described in this paper show that there is no appreciable difference in yield when the same amounts of phosphate (expressed as tricalcium phosphate) are applied in the form of slag or mineral phosphate.

This paper is divided into two sections. The first section is devoted to a brief discussion of the nature of citric solubility in general. Examples are taken from the writer's paper above referred to, in order to show how citric solubility varies. The second section describes the field trials. Those interested in the statistical method of determining the significances of the difference in yield are referred to the writer's paper.²

I. WHAT IS CITRIC SOLUBILITY ?

The "Fertilisers and Feeding Stuffs Act, 1906," provides that the proportions of nitrogen, soluble phosphate, insoluble phosphate, and potash present in any fertiliser must be stated

¹ "The Citric Solubility of Mineral Phosphate," 'Journal of Agricultural Science,' April 1922.

² 'Journal of Agricultural Science,' April 1922.

by the seller in the invoice. The Board of Agriculture was empowered, however, under this Act to make regulations, and on 27th December 1906 a regulation was framed (Statutory Regulations and Orders, 1906, No. 944) defining the form of the test to be carried out on basic slag and basic superphosphate in the event of a seller stating in an invoice the extent to which basic slag or basic superphosphate was citric soluble. This test appears to have been instituted in the belief that there was a direct relationship between the citric solubility of a basic slag, as found by the Board's test, and the availability of the phosphate for the plant in the soil. No chemical or physiological evidence has been advanced to prove this connection, the only comparative tests being yields of crops in the case of slags possessing various degrees of citric solubility. This latter problem is a statistical problem, the solution of which depends for its validity on properly conceived and numerous field trials in order to eliminate the natural variations which occur in all field tests.

It should be explained that no seller is under an obligation to give a guarantee expressing the degree of citric solubility of a basic slag. If, however, he does give a guarantee, the seller must state the result as found from the official test prescribed in the 1906 Regulations. A citric solubility test of a private character, or one differing from the conditions laid down in the Regulations, could not be accepted as the basis of the guarantee of the citric solubility of a basic slag. Further, no purchaser need accept any statement as to the citric solubility of a slag in making a purchase of this fertiliser. It is open to him to say, "I am not interested in the citric solubility of a slag. It is not required under the Fertilisers and Feeding Stuffs Act. All I want is the total amount of phosphate present in the slag expressed as tricalcium phosphate." Purchasers of slags are recommended to take this course, as the author can see no advantage in a guarantee of citric solubility.

Recently, citric solubility has been applied to mineral phosphates and also to compound fertilisers. Many buyers are under the impression that the seller must give a guarantee of citric solubility in these cases. It is clear from the terms of the Act and from the Regulations that no such guarantee is required or is necessary. Sellers are, of course, quite at liberty to make statements respecting the proportions of various substances present in fertilisers, and evidently many sellers guarantee the citric solubility of a phosphatic fertiliser in the belief that they are showing the extent of the availability of the phosphate for the plant in the soil. In one of these tests citric solubility is determined in a much weaker solution of citric acid than that prescribed as official for slags, while the quantity of fertiliser taken for analysis is five times

less than that officially prescribed. Samples of ground mineral phosphate are occasionally guaranteed to contain as much as 50 per cent of citric soluble phosphate on the basis of this test. To the unwary it might look as though this phosphate was more available for the plant because the fertiliser had been treated in a much weaker solution of citric acid than that used officially. Buyers are not familiar with the conditions of testing, and might overlook the fact that a much smaller quantity of fertiliser is used to carry out the test, and as a consequence the amount dissolved, expressed in terms of the small quantity taken, is naturally much greater than when the amount officially prescribed for slags is used as the basis.

To illustrate this point, let us suppose an analyst took, say, (1) 5 grams and (2) 2·5 grams of the same mineral phosphate or slag, and tested them by the official method for citric solubility. The results in both cases are expressed in terms of the weight of the fertiliser taken. A citric solubility of, say, 28 per cent in 5 grams of sample is equal to a citric solubility of 56 per cent if 2·5 grams are taken. Here we see the importance of the weight of sample taken for analysis in determining citric solubility. As a matter of fact, the citric solubility is not doubled if half the weight is taken, but it is proportional to the weight taken. The effect of the weight of sample taken for analysis on citric solubility is clearly seen in the results given in Table I. The amount of citric acid officially prescribed was used in each case, and the volume of the solution was kept constant at 500 c.c., the quantity also prescribed in the Regulations. The quantity of mineral phosphate used in the first experiment was 5 grams, in the second 10 grams, in the third 20 grams, and in the fourth 40 grams.

TABLE I.

No. of experiment	Weight of mineral phosphate taken	Citric solubility per cent of mineral phosphate taken
1	5 grams	19·41
2	10 "	8·66
3	20 "	3·04
4	40 "	1·03

These results show that if we are to judge on the first experiment, the citric solubility of the mineral phosphate would amount to 19·41 per cent. If we are to judge on the fourth experiment the citric solubility would only amount to 1·03 per cent. Now, we have no knowledge of any relationship between the quantities as officially prescribed in the Regulations and the quantity of phosphate available to the

plant in the soil. There does not appear to be any relationship or connection between them. We know that the proportions of phosphate in soils are extremely small, and one could understand a practical test with, say, standard soils containing definite proportions of phosphatic fertilisers. There are great practical difficulties in the way of fixing upon a standard soil, but a test of this kind would have a rational scientific basis, whereas the test for slags, also applied both modified and unmodified to mineral phosphates, has no basis of any kind whatever. It is purely an empirical test, and the amount dissolved depends on many conditions, one being, as just shown, the amount taken for analysis.

What are the other conditions? Let me give a few illustrations. Suppose the amount of the phosphatic fertiliser and the amount of citric acid used in the second series of experiments are kept constant, the amounts being those prescribed by the official method; thus the volume of the solution is the only factor that can be varied in passing from one experiment to another. In the first experiment the volume used was the official volume prescribed (500 c.c.). In the remaining experiments the volume was increased in each case until, in the fifth experiment, the volume was five times greater than that used in the first experiment. The following table (Table II.) shows the results of this series of experiments:—

TABLE II.

No. of experiment.	Volume of solution.	Phosphate dissolved per cent of weight of sample.
1	500 cc.	19·24
2	625 "	20·42
3	833 "	21·75
4	1250 "	24·16
5	2500 "	28·14

It will be seen from this series of experiments that if we are to judge from No. 1, the citric solubility amounts to 19·24 per cent. If we are to judge from, say, No. 4, the citric solubility is 24·16 per cent, while if we are to judge from the last experiment the citric solubility amounts to 28·14 per cent. The net result of this series of experiments is to show that, if the volume is increased, and the acid and mineral phosphate content kept constant, there is more room for the distribution of the mineral phosphate in the process of shaking, and therefore, among other things, a greater opportunity of attack on the phosphate by the acid. This is a phenomenon well known to physical chemists.

Now, mineral phosphates are not included in the Regulations, and therefore there is no official citric solubility test

for mineral phosphates. We therefore ask this question—If citric solubility is given in a guarantee, which of these dilutions must the chemist take in determining citric solubility of mineral phosphate? No answer can be given to this question for the reason already stated, that no relationship has been shown to exist between citric solubility and availability of phosphate in the soil.

A still greater range of citric solubility can be obtained if the quantity of citric acid officially prescribed is again taken throughout the whole series, and instead of 5 grams of the fertiliser only 1 gram is taken. In this series we have constant quantities of 10 grams citric acid and 1 gram mineral phosphate. The volume of the solution was varied from 500 c.c. in the first experiment to 5000 c.c. in the sixth experiment. What now is the citric solubility of this mineral phosphate? If we are to judge from the first experiment it is 53·76 per cent, as against 19·24 per cent found in the parallel experiment in the second series of experiments—that is to say, 34·52 per cent more with one gram than with 5 grams. If we are to judge from the sixth experiment of this (the third) series, the citric solubility is now 61·8 per cent. That is to say, 96 per cent of the whole phosphatic content of the fertiliser is now citric soluble. The following table (Table III.) shows the results of this series :—

TABLE III.

No. of experiment.	Volume of solution	Phosphate dissolved per cent of weight of sample	Per cent dissolved of the total phosphate content.
1	500	53·76	83·3
2	625	54·72	84·8
3	833	56·10	87·0
4	1250	57·08	88·5
5	2500	59·55	92·3
6	5000	61·80	95·8

It is thus seen that, with constant amounts of acid and of sample and large volumes, one can get very high citric solubility, while, with varying quantities of sample and constant amount of acid and constant volume, we get low citric solubility.

We have considered varying quantities of weight of sample and varying volumes of solution. The effect of using varying quantities of citric acid with a constant weight of sample (5 grams) and a constant volume (500 c.c.) will now be considered. The weight of citric acid in the first experiment was 10 grams, and in the succeeding experiments the quantities were reduced until in the sixth experiment only 1 gram was

taken. The following table (Table IV.) shows the result of this series of experiments :—

TABLE IV.

No. of experiment	Weight of citric acid used	Phosphate found per cent of weight of sample	Phosphate found per cent of total phosphate present
1	10 grams	19.35	30.0
2	8 "	16.24	25.2
3	6 "	13.48	20.9
4	4 "	8.99	13.9
5	2 "	4.35	6.7
6	1 "	2.04	3.2

These results show that with constant weight of sample and constant volume of fluid, the strength of acid has got much to do with citric solubility. Naturally the greater the amount of acid present under these conditions the greater will be the amount of phosphate dissolved. Judging by the official test the citric solubility amounts to 19.35 per cent. Judging by the sixth experiment, however, the citric solubility is only 2.04 per cent, and this with a 0.2 per cent solution of citric acid. With the same strength of acid (0.2 per cent) we got (see Table III.) a citric solubility of 61.8 per cent.

Mineral phosphates and slags contain varying amounts of carbonates and other substances which neutralise varying amounts of citric acid. Whatever original quantity of citric acid is therefore taken to determine citric solubility, a varying proportion is used up at once, the indefinite remainder being available to attack the phosphatic compounds. It is thus seen that from this point of view alone the citric solubility test is worthless. *A low citric solubility may mean the presence of carbonates, hydrates, fluorides, or other substances, or it may mean a compound not easily dissolved by citric acid.* As far as mineral phosphate is concerned, it seems clear from Bassett's results that the substance present is hydroxyapatite, a chemical combination of calcium hydrate and tricalcium phosphate. The proportion of phosphate present in the sample of mineral phosphate examined was approximately equal to 65 per cent of tricalcium phosphate, which is equal to about 70 per cent of hydroxyapatite. If mineral phosphate consisted entirely of this substance, the degrees of citric solubility could be stated without analysis from known physical laws if the weights of sample and acid and the volume used were given.

The foregoing results show that an analyst can devise a citric solubility test for any phosphatic fertiliser which will

be nil or 100 per cent according to the conditions set by him. It is seen that it has no basis in theory, but on the other hand, is a test introduced without an adequate consideration of either theory or agricultural practice.

A number of laboratory and field experiments have been conducted by other workers on phosphatic fertilisers, but the writer has been unable to find any decisive test demonstrating that slags and mineral phosphates differ in their results on crop when equivalent quantities of the fertilisers are used, or demonstrating that slags, owing to their high citric solubility, are more available to the plant than other phosphatic fertilisers.

An attempt has been made to determine (1) whether there is any relationship between citric solubility and availability of phosphate to the plant, and (2) what differences exist, if any, between the ordinary phosphatic fertilisers of commerce. The results are summarised in the following section.

II. YIELD OF TURNIP CROP.

Three separate problems were considered, namely :—

- (a) The differences in mean weight of turnips when equal quantities of phosphate were applied to the soil in the form of (1) superphosphate, (2) dicalcium phosphate (reverted phosphate), (3) slag, (4) very finely ground mineral phosphate, and (5) ground mineral phosphate.
- (b) The differences in mean weight between slag and mineral phosphate where both fertilisers possessed approximately the same degree of citric solubility by the official test. It has already been shown that citric solubility varies with the conditions, and in particular when expressed in terms of the total phosphate content. While, therefore, the *official* citric solubilities were practically the same for the slag and mineral phosphate used, the solubilities in terms of total phosphate were widely different.
- (c) The differences in mean weight between very finely ground mineral phosphate and ordinary ground mineral phosphate, the percentage of tricalcium phosphate present being the same in both cases.

The crop tested was a turnip crop, the variety *Early Sheep-fold Yellow* being used in all the experiments.

The following table shows the percentage of phosphate in each of the fertilisers used :—

TABLE V.

Fertilizer.	Phosphate (as tricalcium phosphate) per cent.
Superphosphate	30.0*
Dicalcium phosphate	90.1
Mineral phosphate	64.9
Slag	23.6

* Water soluble.

The mineral phosphate was applied in two grades of fineness—(1) 81 per cent and (2) 100 per cent passing the fine slag sieve (9600 meshes to the square inch). Two separate trials were made—(1) on a light sandy soil, and (2) on a heavy clay soil, both placed at our disposal by Mr James Cruickshank, Cruden Bay, Aberdeenshire. The writer wishes to express his indebtedness to Mr Cruickshank for his help and for his kindness in furnishing plots for these experiments. He wishes also cordially to thank Messrs Horace Williamson, Marshall J. Robb, John E. Ritchie, James Coull, and other members of his staff for their able and valuable assistance, not only in preparing the plots and singling the turnips, but also in the laborious process of weighing each turnip. Every individual turnip was weighed separately in order to determine with as great accuracy as possible whether the yields in the various plots differed significantly from one another or not.

A dressing of $\frac{3}{4}$ cwt. of sulphate of ammonia per acre was uniformly applied over the whole of the plots. The area of each plot was $7 \times 20 = 140$ square feet, and eight plots were used to determine the yield for each kind of phosphatic fertiliser according to the following scheme:—

TABLE VI.

1	2	0	3
3	0	1	2
2	1	3	0
0	3	2	1
4	5	4	5
5	4	5	4

5	4	5	4
1	5	4	5
0	3	2	1
2	1	3	0
3	0	1	2
1	2	0	3

0 = Reverted phosphate.
1 = Superphosphate.

2 = Mineral phosphate.
3 = Finely ground M.P.

4 = Slag
5 = No phosphate.

The phosphatic fertilisers were applied at a rate equivalent to 218 pounds of tricalcium phosphate per acre. The quantities used per acre of the different fertilisers are given in the undernoted table :—

TABLE VII.

QUANTITIES OF PHOSPHATIC FERTILISERS USED PER ACRE.

Fertiliser	Citric official.	Solubility per cent of total phosphate.	Quantity of fertiliser, lbs.	Equivalent quantity of tricalcium phosphate.
Superphosphate	...	...	727	218
Dicalcium phosphate	100	100	242	"
Mineral phosphate	21	33·8	336	"
Basic slag	22	96 1	924	"

It was observed that in the early stages of growth the young plants were stronger on the superphosphate plots and appeared earlier aboveground than the others, both on the sandy and the clay soils. The No. 5 plots * were clearly seen to be the poorest crops, but little outward difference could be observed in the others.

Each weighing was noted on a card, and when the work of collecting the data was finished, a statistical analysis of the results was carried out.

The following tables (Tables VIII. and IX.) show the results of the field experiments in the six series of plots :—

TABLE VIII.

CLAY SOIL.

No. of series.	Phosphatic fertiliser	Average weight of turnip (in pounds)
I.	Zero	1·47
II.	Slag	1·81
III.	Mineral phosphate	1·85
IV.	Fine mineral phosphate	1·93
V.	Dicalcium phosphate	2·01
VI	Superphosphate	2·03

TABLE IX.

SANDY SOIL.

No. of series.	Phosphatic fertiliser.	Average weight of turnip (in pounds)
I.	Zero (no phosphate)	·85
II.	Slag	1·27
III.	Mineral phosphate	1·30
IV.	Fine mineral phosphate	1·32
V.	Dicalcium phosphate	1·35
VI.	Superphosphate	1·31

* Series No. 1.

There was no difficulty in noting that the zero plots gave very poor results when compared with the yields obtained from the plots fertilised by the different varieties of phosphates. The idea of the writer was to use the mean weight of turnip as a measure of the efficient character of the various phosphatic fertilisers, and as far as possible to determine whether the total yields for each series differed from one another to such a degree as to warrant the deduction that the differences were due to the kind of phosphatic fertiliser used. The yield per acre on sandy soil for the zero plots was approximately 7 tons, while for the phosphatic plots the average yield was about 13 tons. On the clay soil the zero plots gave a yield of about 16 tons, while the average yield per acre of the phosphatic plots was about 24 tons. There were three drills in every plot, approximately 24 inches apart, and the distance between each turnip was as nearly as possible 8 inches. Consequently the average number of turnips on each plot would be about 90, or approximately 720 turnips would be obtained from each series of experiments. This corresponds approximately to 28,000 turnips per acre. The actual numbers varied from 476 to 602 on the sandy soil and from 648 to 758 on the clay soil. The experimental plots were selected because of their apparently uniform character, and in the case of the sandy soil because no dressing of farm-yard manure had been applied for some considerable time prior to the date on which the experiments were made. While the soil appeared uniform on examination, prior to the experiments being organised, this uniformity was not realised in practice. The dryness of the season may be one reason for the failure in parts, but doubtless there are other reasons explaining such numbers as 476 and 602 where 720 turnips ought to have come to maturity.

It will be observed that the average weight obtained on the slag plots was practically identical with the figure for mineral phosphate. It is thus seen that no gain was secured in using a fertiliser whose citric solubility was 96 per cent of the total phosphate when compared with a fertiliser whose citric solubility was only 33 per cent of the total phosphatic content. It is concluded that the same average weight was obtained because the same quantity of phosphate per acre had been used in each case. In other words, if equivalent amounts are used, slag and mineral phosphate give similar results. The yield per acre from mineral phosphate was slightly higher than the yield per acre in the slag plots. This answers problem (b).

The average weight of turnip from the mineral phosphate plots on sandy soil and clay soil respectively were 1.30 and 1.85 pounds, while the corresponding plots sown with finely-ground mineral phosphate give 1.32 and 1.93 pounds. There

is a slight advantage in favour of the finely-ground phosphate in both cases, but the difference cannot be regarded from these experiments as being significant. The yield per acre was very slightly greater on the finely-ground mineral phosphate plots when compared with the ordinary mineral phosphate plots. This answers problem (c).

An inspection of Tables VIII. and IX. reveals the fact that dicalcium phosphate (reverted phosphate) and superphosphate give (1) similar results on both soils, and (2) slightly better results than those obtained from the slag and mineral phosphate plots. Again, however, while the advantage is in favour of superphosphate, the differences, while significantly in favour of superphosphate, are not very great. The yields per acre are, however, significantly greater in the cases of superphosphate and reverted phosphate when compared with slag. The difference in equivalent yield per acre between superphosphate and mineral phosphate is *possibly* significant.

The reasons for these deductions are of a mathematical character, and are given together with the data in full detail in a paper sent in to the 'Journal of Agricultural Science.' The main results show that if equivalent quantities of phosphate are applied in the form of slag, mineral phosphate, or superphosphate, other conditions being similar, no greatly significant differences in average weight of turnip can be expected. This answers problem (a).

In order to compare the average weights found on the experimental plots on clay soil with the average weight of turnip found in agricultural practice on clay soils in the district, the writer asked Colonel John L. Reid, Cromley Bank, Ellon, to carry out a series of weighings from a quarter of an acre of a clay field in turnips during 1919. The average weight was 1.97 pounds, which falls midway between the average values for the fine mineral phosphate plots and the reverted phosphate plots on the clay soil at Cruden Bay. The yield per acre was 17 tons, compared with the average yield of 24 tons from the clay soil at Cruden Bay. The variation round the average value at Ellon was, however, less than the variations round the average values on the Cruden Bay clay soil. The weights of individual turnips were also more symmetrically distributed round the average. The writer can see, from these results, certain means of measuring the uniformity of the soil and of detecting differences which would pass unnoticed when the data are treated by the ordinary methods in use.

There is no desire to emphasise the results obtained in these experiments, and they are regarded as purely tentative in character. The method of interpretation, as applied to weight of crop, is, however, novel, and the writer would be glad to see similar experiments repeated on a large scale on different

soils and during different seasons, as he is confident the method will be fruitful in practical results. This preliminary field trial, necessarily limited in character and scope, seems to indicate that equivalent quantities of phosphate will give practically identical mean weights of turnip under similar conditions irrespective of whether slag, mineral phosphate, reverted phosphate, or superphosphate is used. The equivalent yields per acre, however, would probably be higher in the cases of superphosphate and reverted phosphate when compared with mineral phosphate and slag. It is not clear from the results whether there would be significant differences in equivalent yield per acre between slag and mineral phosphate when equivalent quantities of phosphate are applied.

. The foregoing work was rendered possible by a grant very kindly given by the Directors of the Society to cover cost of outlays in both laboratory and field experiments. The writer desires cordially to express his indebtedness to the Directors for placing funds at his disposal for the purpose.

MILK RECORDS.

NINETEENTH YEAR—RECORDS OF 26,766 COWS.

By WILLIAM STEVENSON, B.Sc., N.D.A., N.D.D., Superintendent of Milk Records to the Scottish Milk Records Association.

SYSTEMATIC milk recording in Scotland was continued in 1921 on the same lines as in 1920 and previous years. The work was carried on under the direction of the Scottish Milk Records Association as formerly.

The Association in 1921 consisted of the following members :—

Name and Address.	Body Represented.
Mr P. Wardrop, Garlaff, Cumnock	{ Auchinleck and District Milk Record Society.
Mr Colin Thomson, Brae, Ayr	{ Ayr and District Milk Record Society.
Lieut.-Colonel W. T. R. Houldsworth, Kirkbride, Maybole	{ Carrick Milk Record Society.
Mr John Young, Skerrington Mains, Hurlford	{ Central Ayrshire No. 1 Milk Record Society.
Mr Thomas Drummond, Craighead, Hurlford	{ Central Ayrshire No. 2 Milk Record Society.
Mr John Prentice, Raithhill, Coylton	{ Coylton and District Milk Record Society.
Mr D. Wardrop, Knockterra, Cumnock	{ Cumnock Milk Record Society.
Mr A. Y. Allan, Aitkenbar, Dumbarton	{ Dumbartonshire Milk Record Society.
Mr James Osborne, Ryemuir, Lochmaben	{ Dumfriesshire Milk Record Society (Dumfries and Lochmaben Circuit).
Mr Mungo Sloan, Douglasshall, Ecclefechan	{ Dumfriesshire Milk Record Society (Lower Annandale Circuit).

Name and Address.	Body Represented.
Mr W. L. Ferguson, Catlins, Lockerbie	{ Dumfriesshire Milk Record Society (Upper Annandale Circuit).
Mr Robert Millar, Lakehead, Closeburn	{ Dumfriesshire Milk Record Society (Lower Nithsdale Circuit).
Mr Archibald Kirkpatrick, Barr, Sanquhar	{ Dumfriesshire Milk Record Society (Upper Nithsdale Circuit).
Mr James Hamilton, Headhouse, East Kilbride	{ East Kilbride and District Milk Record Society.
Mr James Mitchell, Wamphray, North Berwick	{ East Lothian Milk Record Society.
Mr Robert M. Reid, The Glen Farm, Falkirk	{ East Stirlingshire Milk Record Society.
Mr William Murdoch, Buntonhill, Kil- maurs	{ High Fenwick Milk Record Society.
Mr William M'Adam, Easter Pitcorthie, Dunfermline	{ Fife Milk Record Society, Circuit No. 1.
Mr J. W. Miller, Lochhead, West Wemyss	{ Fife Milk Record Society, Circuit No. 2.
Mr D. F. Mackenzie, of Parks of Inshes, Inverness	{ Highland Milk Record Society.
Mr John Finnie, Camphill, Dalry	{ "John Speir" Milk Record Society.
Mr Gavin Hamilton, British Linen Bank, Lesmahagow	{ Lesmahagow Milk Re- cord Society.
Mr J. W. Edgar, Dourie, Port William	{ Lower Wigtownshire Milk Record Society, Circuit No. 1.
Mr James Barr, Low Glasnick, Kirkcowan	{ Lower Wigtownshire Milk Record Society, Circuit No. 2.
Mr William Wallace, Auchenbrain, Mauchline	{ Mauchline Milk Record Society.
Mr Thomas Barr, Hobsland, Monkton	{ Monkton and District Milk Record Society.
Mr Robert Laird, Lawthorn, Irvine	{ Montgomerie Milk Record Society.

Name and Address.	Body Represented.
Mr J. A. Carlyle, B.Sc., 2 Addison Place, Arbroath	{ North of Scotland Milk Record Society.
Mr John N. Watson, Cawhillan, Ochiltree	{ Ochiltree Milk Record Society.
Mr Robert M'Alister, Mid Ascog, Rothesay	{ Renfrew and Bute Milk Record Society (Bute & Inverkip Circuit).
Mr John Telfer, Branchal, Bridge of Weir	{ Renfrew and Bute Milk Record Society (Kil- macolm and District Circuit).
Mr George Buchanan, Hunterhill, Paisley	{ Renfrew and Bute Milk Record Society (Paisley and District Circuit).
Mr William Howie, Carnwadric, Thornliebank	{ Renfrew and Bute Milk Record Society (Upper Ward Circuit).
Mr William Goldie, East Boreland, Glenluce	{ Rhins of Galloway Milk Record Society (Castle Kennedy & Dunragit Circuit).
Mr Andrew Cochran, High Ardwell, Kirkcolumb	{ Rhins of Galloway Milk Record Society (Kirk- columb and District Circuit).
Mr T. R. Evans, Alton, Drummore	{ Rhins of Galloway Milk Record Society (Kirk- maiden and District Circuit).
Mr John Forster, Mains of Larg, New Luce	{ Rhins of Galloway Milk Record Society (Luce Valley Circuit).
Mr John M. H. Whyte, Kirkmabreck, Stranraer	{ Rhins of Galloway Milk Record Society (Stoneykirk and District Circuit).
Mr James A. Gilmour, South Cairn, Stranraer	{ Rhins of Galloway Milk Record Society (Stranraer and Dis- trict Circuit).

Name and Address.	Body Represented.
Brig.-Gen. J. A. Houson-Craufurd, Dunlop House, Dunlop	Stewarton and Dunlop Milk Record Society.
Major C. R. Dudgeon, Cargen Holm, Dumfries	Stewartry of Kirkcudbright Milk Record Society, Circuit No. 1.
Mr H. W. B. Crawford, of Chapmanton, Castle-Douglas	Stewartry of Kirkcudbright Milk Record Society, Circuit No. 2.
Mr Hugh G. Baird, Kirkchrist, Kirkcudbright	Stewartry of Kirkcudbright Milk Record Society, Circuit No. 3.
Mr W. P. Gilmour, Balmangan, Kirkcudbright	Stewartry of Kirkcudbright Milk Record Society, Circuit No. 4.
Sir Thomas Clement, K.B.E., of Netherton, 64 Albion Street, Glasgow	The Ayrshire Cattle Herd - Book Society of Great Britain and Ireland.
Mr James Howie, Hillhouse, Kilmarnock	
Mr Thomas C. Lindsay, Aitkenbrae, Monkton	
Mr A. W. Montgomerie, Lessnessock, Ochiltree	
Mr Matthew Bowie, Blackbyres, Barrhead,	The British Friesian Cattle Society.
Mr Alexander Munro, of Leanach, Culloden Moor, Inverness	
Mr T. F. Anderson, Cairnfield, Lerwick	The Shetland Cattle Herd-Book Society.
Mr A. B. Garrick, Greenfield, Lerwick	
Mr John M'Caig, Belmont, Stranraer	The Highland and Agricultural Society of Scotland.
Major D. A. Spence, V.D., of Conveth Mains, Montrose	
Sir Hugh Shaw Stewart, Bart., C.B., of Ardgowan, Inverkip	
Mr Charles M. Douglas, C.B., D.Sc., of Auchlochan, Lesmahagow	The West of Scotland Agricultural College.
Mr T. C. Lindsay, Aitkenbrae, Monkton	
Principal W. G. R. Paterson, 6 Blythswood Square, Glasgow	
Dr Alex. Lauder, 13 George Square, Edinburgh	The Edinburgh and East of Scotland College of Agriculture.
Mr W. Smith, B.Sc., 13 George Square, Edinburgh	

Name and Address.	Body Represented.
Mr G. G. Esslemont, C.B., B.Sc., 41½ Union Street, Aberdeen	The North of Scotland College of Agriculture.
Professor Hendrick, Marischal College, Aberdeen	
Mr J. F. Tocher, D.Sc., 41½ Union Street, Aberdeen	Co-opted Members.
Mr Andrew Clement, Netherton, Newton Mearns	
Mr Robert Dickie, of Messrs J. & W. Wallace, 498 Gallowgate, Glasgow	
Mr John Drysdale, 5 St Andrew Square, Edinburgh	
Mr James Dunlop, Board of Agriculture for Scotland, Edinburgh	
Mr George Hobson, 4 Southampton Row, London, W.C. 1.	

Chairman—Mr Robert Dickie.

The following are the principal members of the staff :—

Secretary and Treasurer—Mr John Howie.

Superintendent—Mr William Stevenson, B.Sc., N.D.A., N.D.D.

Assistant-Superintendent—Mr Percy H. Hart.

ADMINISTRATION.

In 1921, as in previous years, the Association's milk recording was administered through local Milk Record Societies. The grant for milk recording from the Development Fund, obtained through the Board of Agriculture for Scotland, was continued in 1921 on the same conditions as in the previous year. The total grant for 1921 amounted to £4264.

The Ayrshire Cattle Herd Book Society continued their grant of £50 to the Association.

Grants were allocated to local societies on the following scale :—

1. Societies testing at intervals of not more than twenty-one days :—

(a) The hire of the necessary milk-testing appliances free of annual charge, the society to upkeep the apparatus in good condition.

- (b) An annual grant of 50s. to each new member in his first or second year, and of 15s. to each member in his third or fourth year.
- (c) An annual grant of 28s. per member towards the cost of surprise check tests.

2. Societies testing at intervals of from twenty-two to twenty-eight days :—

- (a) The hire of the necessary milk-testing appliances free of annual charge, the society to upkeep the apparatus in good condition.
- (b) An annual grant of 30s. to each new member in his first or second year, and of 15s. to each member in his third or fourth year.
- (c) An annual grant of 25s. per member towards the cost of surprise check tests.

During the latter part of 1920 every effort was made to obtain additional applications for membership of local societies in 1921, and 138 applications were obtained throughout the various dairying districts of Scotland. For various reasons, such as members disposing of their dairy herds, abortion in herds, &c., 34 members towards the end of the year intimated their resignation. Also, a number of the new applicants could not be accommodated in existing or new local societies, owing to their being isolated in more or less non-dairying districts.

The 37 local societies or circuits which operated in 1920 all continued in 1921, and 7 new societies or circuits were formed, viz. :—

1. Coylton and District Society.
2. Dumfries and Lochmaben Circuit.
3. The Highland Milk Record Society.
4. Luce Valley Circuit.
5. Stranraer Circuit.
6. Paisley and District Circuit.
7. Stewartry No. IV. Circuit.

The total number of milk record societies or circuits affiliated with the Association in 1921 was 44, and 44 trained recorders were constantly employed during the greater part of the year, compared with 37 in 1920. The total number of herds tested in 1921 was 670, compared with 587 in 1920. The total number of cows tested in 1921 was 26,766, compared with 24,023 in the previous year, the largest number in the history of the Association.

The following is a list of the Milk Record Societies which operated in 1921, with the name and address of the secretary of each society :—

Name of the Society.	Secretary.
Auchinleck & District	Mr Andrew Wilson, Finlayston, Ochiltree.
Ayr and District	Mr Robert Littlejohn, Genoch, Ayr.
Carrick	Mr W. D. M'Cubbin, Lochlands, Maybole.
Central Ayrshire No. 1	Mr James Howie, Hillhouse, Kilmarnock.
Central Ayrshire No. 2	{ Mr James Cochrane, Holmes Farm, Kilmarnock.
Coylton and District	Mr Alex. Kilpatrick, Smithston, Patna.
Cumnock	Mr W. D. Wardrop, Rigg, Auchinleck.
Dumbartonshire	Mr John Bilsland, Quay Place, Dumbarton.
Dumfriesshire (Dumfries & Lochmaben Circuit)	{ Mr Thomas Henderson, Solicitor, Lockerbie.
Dumfriesshire (Lower Annandale Circuit)	{ Mr Thomas Henderson, Solicitor, Lockerbie.
Dumfriesshire (Upper Annandale Circuit)	{ Mr Thomas Henderson, Solicitor, Lockerbie.
Dumfriesshire (Lower Nithsdale Circuit)	{ Mr Thomas Henderson, Solicitor, Lockerbie.
Dumfriesshire (Upper Nithsdale Circuit)	{ Mr Thomas Henderson, Solicitor, Lockerbie.
East Kilbride and District	{ Mr Arthur Gilmour, 11-13 Macfarlane Street, Glasgow.
East Lothian	{ Mr James L. Nisbet, Easter Newton, Kirknewton.
East Stirlingshire	Mr R. M. Reid, The Glen Farm, Falkirk.
Fenwick (High)	Mr James Mather, Low Gainford, Fenwick.
Fife, Circuit No. 1	Mr Wm. Macniven, Royal Bank, Kirkcaldy.
Fife, Circuit No. 2	Mr Wm. Macniven, Royal Bank, Kirkcaldy.
Highland	Mr J. M. Hunter, Queensgate, Inverness.
"John Speir"	Mr William Longwill, Hawhill, Dalry.
Lesmahagow	{ Mr Gavin Hamilton, British Linen Bank, Lesmahagow.
Lower Wigtownshire, Circuit No. 1	{ Mr David Breckenridge, Solicitor, Newton Stewart.
Lower Wigtownshire, Circuit No. 2	{ Mr David Breckenridge, Solicitor, Newton Stewart.
Mauchline	Mr Wm. Wallace, Auchenbrain, Mauchline.
Monkton and District	Mr William Howie, Brieryside, Monkton.
Montgomerie	Mr Robert Laird, Lawthorn, Irvine.
North of Scotland	{ Mr John A. Carlyle, B.Sc., 2 Addison Place, Arbroath.

Name of the Society.	Secretary.
Ochiltree	Mr A. W. Montgomerie, Lesanessock, Ochiltree.
Renfrew & Bute (Bute & Inverkip Circuit)	Mr W. G. MacDougall, Solicitor, Paisley.
Renfrew & Bute (Kilmacollm and District Circuit)	Mr W. G. MacDougall, Solicitor, Paisley.
Renfrew & Bute (Paisley and District Circuit)	Mr W. G. MacDougall, Solicitor, Paisley.
Renfrew & Bute (Upper Ward of Renfrewshire Circuit)	Mr W. G. MacDougall, Solicitor, Paisley.
Rhins of Galloway (Castle Kennedy & Dunragit Circuit)	Mr John Gibson, Solicitor, Stranraer.
Rhins of Galloway (Kirkcolumb & District Circuit)	Mr John Gibson, Solicitor, Stranraer.
Rhins of Galloway (Kirkmaiden and District Circuit)	Mr John Gibson, Solicitor, Stranraer.
Rhins of Galloway (Luce Valley Circuit)	Mr John Gibson, Solicitor, Stranraer.
Rhins of Galloway (Stoneylirk & District Circuit)	Mr John Gibson, Solicitor, Stranraer.
Rhins of Galloway (Stranraer and District Circuit)	Mr John Gibson, Solicitor, Stranraer.
Stewarton and Dunlop	Mr James Clark, Fingart, Dunlop.
Stewartry of Kirkcudbright, Circuit No. 1	Mr Patrick Gifford, Solicitor, Castle-Douglas
Stewartry of Kirkcudbright, Circuit No. 2	Mr Patrick Gifford, Solicitor, Castle-Douglas
Stewartry of Kirkcudbright, Circuit No. 3	Mr Patrick Gifford, Solicitor, Castle-Douglas.
Stewartry of Kirkcudbright, Circuit No. 4.	Mr Patrick Gifford, Solicitor, Castle-Douglas.

SEASON 1921.

The table on this and the following page shows for each society the number of members, the number of cows tested, the average interval between the tests, and the duration of the recording season :—

Name of the Society.	No. of Members.	Number of Cows Tested.	Average Interval between Tests, in days.	Duration of Recording Season, in weeks.
1. Auchinleck and District .	14	416	21	52
2. Ayr and District . .	17	524	21	52
3. Carrick	15	552	21	52
4. Central Ayrshire, No. 1 .	14	531	21	52
5. Central Ayrshire, No. 2 .	16	498	21	52
6. Coylton and District . .	15	451	21	52
7. Cumnock	15	454	21	52
8. Dumbartonshire	15	608	21	52
9. Dumfriesshire (Dumfries and Lochmaben) }	17	713	26	52
10. Dumfriesshire (Lower Annandale) }	16	769	25	52
11. Dumfriesshire (Upper Annandale) }	17	657	26	52
12. Dumfriesshire (Lower Nithsdale) }	16	599	26	52
13. Dumfriesshire (Upper Nithsdale) }	15	746	25	52
14. East Kilbride and District .	16	512	24	52
15. East Lothian	12	205	17	52
16. East Stirlingshire . . .	11	278	16	52
17. Fenwick (High)	18	590	27	52
18. Fife, Circuit No. 1 . . .	17	493	22	52
19. Fife, Circuit No. 2 . . .	14	444	20	52
20. Highland	18	241	28	52
21. "John Speir"	21	521	28	52
22. Lesmahagow	18	536	28	52
23. Lower Wigtownshire, Circuit No. 1 }	17	1124	28	50
24. Lower Wigtownshire, Circuit No. 2 }	19	949	28	50

Name of the Society.	No. of Members	Number of Cows Tested.	Average Interval between Tests, in days.	Duration of Re- cording Season, in weeks
25. Mauchline	13	531	20	52
26. Monkton and District	15	577	21	52
27. Montgomerie	19	470	28	52
28. North of Scotland	13	312	28	52
29. Ochiltree	13	453	20	52
30. Renfrew and Bute (Bute and Inverkip) }	16	428	25	52
31. Renfrew and Bute (Kilma- colm and District) }	13	278	21	52
32. Renfrew and Bute (Paisley and District) }	16	373	22	52
33. Renfrew and Bute (Upper Ward of Renfrewshire) }	15	554	22	52
34. Rhins of Galloway (Castle Kennedy and Dunragit) }	13	787	21	52
35. Rhins of Galloway (Kirk- colm and District) }	11	745	20	52
36. Rhins of Galloway (Kirk- maiden and District) }	10	906	24	52
37. Rhins of Galloway (Luce Valley) }	13	891	22	52
38. Rhins of Galloway (Stoney- kirk and District) }	11	737	21	52
39. Rhins of Galloway (Stran- raer and District) }	13	864	21	52
40. Stewarton and Dunlop	14	426	21	52
41. Stewartry of Kirkcudbright, Circuit No. 1 }	19	966	28	52
42. Stewartry of Kirkcudbright, Circuit No. 2 }	17	941	28	52
43. Stewartry of Kirkcudbright, Circuit No. 3 }	18	1113	28	52
44. Stewartry of Kirkcudbright, Circuit No. 4 }	19	1003	28	52
Total No.	670	26,766	...	...

DEFINITIONS.

The milk records compiled by the Association are records of the estimated quantity of milk produced by each cow in a separate lactation, and of the estimated percentage of milk-fat contained in the milk. For convenience a gallon of milk was reckoned as 10 lb. A gallon of milk of average quality weighs almost exactly $10\frac{1}{3}$ lb. The following further particulars concerning each record were also given, wherever possible :—

- Name of cow, byre number, and herd-book number.
- Sire of cow, and herd-book number of sire.
- Dam of cow, and herd-book number of dam.
- Date of birth.
- Date of calving preceding opening of record.
- Number of weeks in milk.
- Date of next calving after record closed.

The following particulars of *the preceding record* were appended to each record, where available :—

- Date of calving preceding opening of record.
- Quantity of milk in gallons.
- Percentage of fat in milk.
- Number of weeks in milk.

The milk yields were estimated in respect of quantity and milk-fat percentage from the results of systematic periodic tests by trained recorders approved by the Association. The recorders visited the farms for this purpose at intervals varying from fourteen to not more than twenty-eight days, and each date of visit was regarded as the middle day of the period covered by the visit. Milk records estimated in this way approximate closely to the actual milk yields.

METHOD OF RECORDING ADOPTED.

A distinctive feature of milk recording in Scotland in 1921, as in former years, was that the records were entirely the work of trained official recorders. Recorders had previously to undergo a special course of training in milk recording at the West of Scotland Agricultural College Dairy School, or other approved College of Agriculture. Only candidates of good character and good general education were selected to attend these courses; and all recorders, before appointment, were approved by the Executive Committee of the Association.

The Executive Committee fully realise how much depends upon the individuality of the official recorder.

All dairy farmers taking advantage of the Association's scheme were arranged into local Milk Recording Societies employing one or more recorders, the Executive Committee having the power to transfer members from one local society to another, in order to find accommodation for new applicants, and at the same time avoid overlapping of recorders' circuits. Each local society applying to the Association for licence to conduct milk recording under the Association's scheme signed the form containing the Association's rules and regulations, and agreed to conform to these rules. The local society selected and appointed their recorder or recorders from the list of approved recorders obtained from the Association. Apparatus, chemicals, sheets, and books were selected and arranged for by the Association, all byre sheets and record books used by the recorders being supplied free of charge. Thus, uniformity of methods was as far as possible assured.

The official recorder visited each herd at irregular intervals of not more than twenty-eight days, or more usually from eighteen to twenty-three days. He, or she, arrived at the farm in the afternoon, usually by means of a small pony and trap provided by the local society for the purpose, and remained at the farm overnight. All cows giving milk in each herd, as far as was possible, were included in the records. Each cow was clearly distinguished in the byre by a stall number on the wall, immediately in front of, and above the level of, the cow, and registered animals were also indelibly tattooed on the ears with distinctive registered tattoo markings. The cows were milked in the same rotation, evening and morning, on the occasion of the recorder's visit. The recorder weighed and sampled the milk of each cow in the evening, noting the time at which each cow was milked, and entered the results in the corresponding columns in the byre sheet, taking up a position in the byre as near to the milkers as possible, so as to have them in full view, and as far as practicable receiving the milk direct from the milker at the cow's side. He again weighed and sampled the milk of each cow in a similar manner in the morning, and entered the results in the byre sheets. He then tested the mixed evening and morning sample for each cow by the Gerber method for percentage of milk-fat. He entered in the byre sheet a note of the average ration for the herd and any unusual conditions likely to affect the milk yields. The recorder was required to see that all milk samples and byre sheets were securely locked up overnight or during his absence. From the daily results the recorder calculated and completed the byre sheets, multiplying the yields by the exact number of days which

had elapsed since the last test, but so calculating throughout that each day of visit was regarded as the middle day of the period covered by the test. Special ready-reckoners were used to facilitate calculating and to ensure greater accuracy.

The byre sheets were written out in duplicate. The principal copies were posted at regular intervals to the offices of the superintendent, and the carbon copies left with the respective members. The recorder transferred the results from the extended byre sheet to the milk record book for the herd indelibly in ink, each cow being assigned a separate page, at the top of which full particulars of the cow were entered, including the indelible tattoo-marks on the animal.

All byre sheets were carefully revised and corrected in the superintendent's offices during the season, and a list of the necessary corrections sent to each recorder periodically to be entered in the record books.

Surprise visits of inspection were made to each recorder and to the members of local societies at the different farms periodically throughout the year by members of the Association's staff, also a number of surprise check tests, and reports thereon submitted to the Executive Committee. The Executive Committee reserved the right to withdraw approval of any recorder at any time or to limit the period of service of any recorder with any particular society; while members of local societies refusing to observe any of the rules of the Association, or deemed to be guilty of conduct injurious to the true interests of milk recording, were liable to be temporarily or permanently suspended.

Surprise check tests of each herd by the recorder were also systematically arranged, the records of each herd being checked in this way about three or four times throughout the year. The recorder was instructed by a letter from the superintendent's offices on a given date, unknown to recorder and owner of herd, to remain at the same farm another day and make another complete twenty-four hours' test. The surprise test results were entered on special buff-coloured byre sheets, and in the record books in red ink immediately below the results of the regular test of the previous day. The buff byre sheets were posted to the superintendent's offices with the other sheets, and any abnormal differences were immediately noted and reported to the Executive Committee.

As a result of this system of surprise check tests each page of the 1921 milk record books contains about three or four lines of entries in red, comparison of which with the immediately preceding entries provides valuable evidence of the genuineness or otherwise of the milk records.

All records were closed at the end of December, the current lactations being carried forward to the new books of the following year. Finally, summary sheets were written out in

duplicate showing the total milk yields for each cow for the lactation or part-lactation, with full particulars of the cow, dates of calving, &c. The principal copy of the summary sheet was posted to the superintendent's offices with the record book, and the second copy left with the owner of the herd.

All record books and summary sheets are carefully revised, corrected in detail, and initialled in the superintendent's offices during the next few months, the record books being returned later to the respective members, and the summary sheets retained and bound for future reference, but this part of the work for 1921 at time of writing has not been completed.

The milk records are next classified into three groups for cows and heifers respectively, on the following basis. Experience has confirmed the view that a very useful comparison is obtained by reckoning the yields at their estimated equivalent of milk of 1 per cent fat. Such a comparison takes into consideration both the quantity and the quality of the milk.

Cows with a milk record equivalent to not less than 2500 gallons at 1 per cent fat, and heifers with a milk record equivalent to not less than 2000 gallons of 1 per cent fat, are grouped into Class I. Cows and heifers with milk records of less than two-thirds of these amounts—viz., 1660 and 1330 gallons respectively, are grouped into Class III.

The following short table shows the corresponding values of these yields in fairly good milk of 3·5 per cent milk-fat :—

Class.	Yield in Milk of 1 Per Cent Fat. (Gallons.)	Corresponding Yield in Milk of 3·5 Per Cent Fat. (Gallons.)
Cows in Class I. .	Not less than 2500	714
Heifers in Class I. .	Not less than 2000	571
Cows in Class III. .	Less than 1660	474
Heifers in Class III.	Less than 1330	380

All cows and heifers falling between these limits come into Class II. Such animals naturally claim less attention than the good milkers or the obviously unprofitable animals. It should be noted, however, that Class II. includes a certain number of unclassifiable yields, as there are a number of instances where, from various causes, the results of a whole normal lactation cannot be obtained.

The Association will publish an Annual Report giving all details of the work of the Association, and of each local Milk Recording Society during 1921. This report will include

tables showing for each farm the number of cows and heifers tested, the number and percentage included in Classes I. and III. respectively, and the average milk yield per herd. Each herd is included under the respective local society, but is represented only by an alphabetical letter, the owner being advised privately of the identity in the report of his own herd or herds. From these tables any member can see at a glance how his herd compares with other herds in his own or any other district, and the improvement in his own herd compared with previous years. The report will also show in tabular form the percentage of Class I. and Class III. animals of all animals tested under the Association's scheme during the year, and will thus afford a valuable indication of the progress in milk production generally.

An important feature of the Association's Annual Reports from 1917 inclusive is the register of good-milking cows with the names and addresses of owners, and full particulars of the milk records. This register includes only milk records eligible for Class I., and is further restricted to animals which have completed their lactation before the end of the year and given birth to another calf before 1st May of the year following. The fullest available particulars of each record are given, and all lists of records are submitted to the owners of the respective animals for revision before publication. The register is of great value to all interested in increased milk production and in the breeding and rearing of animals of the best milking strains, and is invaluable for future reference.

It should always be kept in mind when making a comparison of cows in different herds or in different districts that the different methods of dairying practised have a considerable influence on the milk yields, and that therefore milk yields alone do not necessarily indicate the true, relative, inherent, or hereditary milk qualities of the animal. But the authenticated milk records compiled by the Association ought to be of inestimable value to breeders and owners of dairy cows if properly interpreted.

GENERAL REVIEW.

These short annual reports on Milk Recording for the 'Transactions' have had in recent years to be prepared too early in the year to permit of definite information on the actual milk yields of the year under review being included in the report. Before the milk records can be properly classified the whole of the records (approximately 30,000 in 1921) have to be carefully revised and corrected. Thus the results

in milk yield in 1920 could not be included in the 'Transactions' of last year. It should therefore be of interest to refer here in the first place to the milk yields of 1920, so that the continuity of these annual reports may be maintained, and attention drawn to the success or otherwise of milk-recording farmers in their endeavours to improve the milk yields of their dairy herds.

As was pointed out last year, the general conditions for milk production in 1920 were probably more favourable than in either of the three preceding years. With regard to weather conditions, the spring throughout was unusually wet and cold, but the rainfall and temperature over the summer and autumn generally were conducive to normal milking in dairy herds. It was to be anticipated, therefore, that in the herds tested regularly over a number of years the percentage of Class I. records in 1920, and the average milk yields, would be found to be higher than in the immediately preceding years; though, on the other hand, the inclusion of such a large proportion of herds not previously tested, or regularly tested, would result in a lower average standard than would have been attained had so many new herds not been included.

The following table shows for each Society the number and percentage of cows and heifers of each class in 1920 :—

Society.	Cows and Heifers				
	Number.			Per Cent.	
	Total.	Class I.	Class III.	Class I.	Class III.
1. Auchinleck and District	455	311	8	68	2
2. Ayr and District	588	442	7	75	1
3. Carrick	633	383	14	61	2
4. Central Ayrshire, No. 1	519	289	13	56	3
5. Central Ayrshire, No. 2	514	305	13	59	3
6. Cumnock	495	365	6	74	1
7. Dumbartonshire	552	313	21	57	4
8. Dumfriesshire (Lower An- nandale)	830	464	42	56	5
9. Dumfriesshire (Upper An- nandale)	745	562	2	75	...
10. Dumfriesshire (Lower Niths- dale)	756	386	56	51	7
11. Dumfriesshire (Upper Niths- dale)	765	438	33	57	4
12. Dunragit	895	455	29	51	3
13. East Kilbride and District	491	226	13	46	3

Society.	Cows and Heifers.				
	Number.			Per Cent	
	Total.	Class I.	Class III.	Class I.	Class III.
14. East Lothian . . .	102	...	...	...*	...*
15. East Stirlingshire . . .	173	...	...	...*	...*
16. Fenwick (High) . . .	634	437	4	69	1
17. Fife, Circuit No. 1 . . .	508	239	22	47	4
18. Fife, Circuit No. 2 . . .	382	169	16	49*	5*
19. "John Speir" . . .	548	298	11	54	2
20. Kirkcolm and Leswalt . . .	1181	540	70	46	6
21. Kirkmaiden and Stoneykirk . . .	1182	597	26	51	2
22. Lesmahagow . . .	549	368	...	70*	...*
23. Lower Wigtownshire, Circuit No. 1 . . .	1152	371	119	32	10
24. Lower Wigtownshire, Circuit No. 2 . . .	917	457	29	50	3
25. Mauchline . . .	578	436	7	75	1
26. Monkton and District . . .	548	274	25	50	5
27. Montgomerie . . .	561	390	7	70	1
28. North of Scotland . . .	331	177	2	55*	1*
29. Ochiltree . . .	442	321	2	73	...
30. Renfrewshire (Lower Ward) and Bute, Circuit No. 1 . . .	498	425	1	87*	...*
31. Renfrewshire (Lower Ward) and Bute, Circuit No. 2 . . .	479	281	11	59	2
32. Renfrewshire (Upper Ward) . . .	555	260	9	47	2
33. Stewarton and Dunlop . . .	556	379	12	68	2
34. Stewartry of Kirkcudbright, Circuit No. 1 . . .	1034	487	39	47	4
35. Stewartry of Kirkcudbright, Circuit No. 2 . . .	1067	527	43	49	4
36. Stewartry of Kirkcudbright, Circuit No. 3 . . .	1227	565	29	46	2
37. Stranraer and Kirkcolm . . .	749	228	38	30	5
Of all the cows and heifers tested in 1920 . . .	24,191	13,165	779	55½*	3½*
Comparison with 1919 . . .	20,786	10,155	938	49½*	4½*
Comparison with 1918 . . .	17,827	8,715	996	49*	5½*
Comparison with 1917 . . .	19,564	9,700	919	50	4½
Comparison with 1916 . . .	22,702	11,702	1042	53½	4½
Comparison with 1915 . . .	26,572	12,313	1561	46	6
Comparison with 1914 . . .	26,424	10,439	2307	39½	9

* Excluding herds tested during only part of the recording season—
354 cows in all.

Of the total of 24,191 cows and heifers tested in 1920, 13,165 were included in Class I., and only 779 in Class III. Excluding 354 animals in herds tested during only a part of the

season, and therefore not classified, this is equivalent to $55\frac{1}{2}$ per cent in Class I. and $3\frac{1}{2}$ per cent in Class III. In 1919, $49\frac{1}{2}$ per cent were eligible for Class I. and $4\frac{1}{2}$ per cent were included in Class III., so that the records of 1920, compared with the records of the previous year, show the substantial improvement of $5\frac{1}{2}$ per cent of all animals tested in Class I., and an improvement—viz., a decrease—of $1\frac{1}{2}$ per cent in Class III.

On account of the extensive rearrangement of the great majority of local societies of 1919, already referred to, and the inclusion of an unusually large proportion of new members in the local societies or circuits of 1920, no useful comparison of the results of individual societies with the results of the same societies in the previous year can be made. But it is evident that improvement in milk yield was fairly general throughout.

Thus further evidence has been obtained of a definite and steady improvement from year to year in the inherent or hereditary milking qualities of the herds tested under the scheme of the Association. Much of this improvement was obscured in recent years by the effects of exceptionally unfavourable conditions for milk production due to the war; but in 1920, as soon as circumstances had become more normal, it became again manifest, and to an increased degree, in actual milk yield. Though the average standard attained was undoubtedly lowered by the inclusion of an unusually large proportion of new herds, the percentage of animals qualifying for inclusion in Class I. in 1920 is the largest in the history of milk recording in Scotland—viz., 2 per cent higher than in 1916—the previous best year in this respect. It is significant also that the percentage included in Class III.—the obviously unprofitable class—is the lowest on record.

The following table shows a comparison of the average results for (1) all the herds tested continuously for five years or over; (2) herds which were not tested continuously for five years; and (3) all the herds tested in 1920 for the first season:—

	Cows and Heifers.				
	Number.			Per Cent.	
	Total.	Class I.	Class III.	Class I.	Class III.
Herds tested continuously for 5 years or over	14,450	8906	317	62	2
Herds tested for less than 5 years continuously	9,741	4259	462	44	5
Herds tested for the first season in 1920. (107 herds.) . .	3,412	1162	198	34	6

Taking first the percentage of animals in Class I. in the above table, it will be observed that in the case of herds tested for the first season in 1920 this is only 34 per cent ; for herds tested for less than five years it is 44 per cent ; while for herds tested continuously for five years or over it is as high as 62 per cent. The corresponding figures for Class III. are 6 per cent, 5 per cent, and 2 per cent respectively. These results are remarkably consistent with what any one following the effects of milk recording in Scotland from year to year would expect to find. No more convincing proof of the great advantages obtained from systematic milk recording could be desired.

In view of the above results, it is little use dairy farmers contending, as many still do, that they know their cows sufficiently well, and can improve their herds as quickly without milk records. On the contrary, the results prove that milk recording is indispensable to all progressive dairy farmers. They clearly establish the fact that in general the herds of members who have consistently continued milk recording over a period of years—the regular milk record herds—are in a far better position to-day, both in regard to milk yield and capital value, than herds tested irregularly or for only a comparatively short period ; also that the superiority of regular milk record herds over herds tested for only one season is still more pronounced.

Further, it is a fair assumption that the new herds obtained from year to year are superior in milking qualities to the average dairy herd in Scotland outside the ranks of recorded herds ; that the average percentage of Class I. cows in non-recording herds throughout the country, if tested, would be appreciably less than 34 per cent ; and that therefore the difference between the average non-recorded herd and the average regular milk record herd is greater than anything shown in the above table. In this connection it should be noted that no fewer than 168 herds had not less than 75 per cent in Class I. of all animals tested in 1920.

Convincing evidence from a reliable and entirely independent source is also provided in the recent report to the Board of Agriculture for Scotland on an investigation into the cost of milk production in Scotland for year ending 14th May 1921 by the chief Costings Officer for Scotland of the recent Agricultural Costings Committee. The figures therein tabulated show that the best results were obtained from the farms in Class I. (summer period), consisting wholly of breeding stocks in the west and south-west of Scotland. The report reads :—

“ The evidence is clear that the annual yield per cow on these farms is considerably above the generally-accepted average for the whole country, and this is to

be expected from the fact that 13 out of these 20 farms keep systematic milk records. It may be significant that of the 7 non-recorded farms, 5 have the lowest average milk yield per cow-day. Table 5 shows that several farms had an extremely good average milk yield. Thus, farms 45 and 46 had an average over the whole year and for all cows of 2·21 and 2·31 gallons per cow-day respectively, or the equivalent of over 820 gallons per cow per annum. Both of these are milk record Ayrshire breeding stocks in a high-lying district."

Comment on the above extract is hardly necessary, but it may be pointed out that had the group of 20 herds referred to not included the 7 non-recorded herds, 5 of which had the lowest average milk yields per cow-day, the superior milking qualities of the remaining 13 recorded herds would have been still more strikingly demonstrated.

Improvement from milk recording is obtained mainly in three directions—by selecting and breeding according to actual milk yields, by more effective feeding according to milk yields, and by increasing the interest in and improving the general management of the herd. The milk records of the Association show that the usual effect of the first five years' continuous recording is to almost double the number of Class I. animals in the herd. It is impossible to point to any other sphere of agriculture to which a development grant has been applied with equally good results. Milk records, and the methods by which the higher milk yields are obtained, are in the highest degree educative to dairy farmers and all interested in milk production, while the larger number of more economical milk-producing cows in Scotland, with their greatly enhanced capital and breeding value, represents an additional national asset of great importance. If all dairy farmers could only cast aside prejudice or conservatism in this connection an almost incalculable gain to the whole community would result.

During the latter part of 1920 every effort was made to obtain additional applications for membership of local societies in 1921, and 138 applications were obtained throughout the various dairying districts of Scotland. For various reasons, such as members disposing of their dairy herds, abortion in herds, &c., 34 members towards the end of the year intimated their resignation. Also a number of the new applicants could not be accommodated in existing or new local societies, owing to their being isolated in more or less non-dairying districts.

Recording was carried on in 1921 by 44 local societies or circuits, comprising 670 members, compared with 37 circuits and 587 members in the previous year—an increase of 83

members. The number of cows tested in 1921 was 26,766, compared with 24,191 in 1920—an increase of 2575 cows, and the largest number in the history of the Association.

During the year 27 recorders, for various reasons, terminated their engagement. The Executive Committee, however, in the same period, approved of 41 applicants for the position of milk recorder, and were able to recommend a sufficient number of qualified recorders. Thirty women recorders were employed in 1921 and 32 men recorders.

In this connection the Committee, as formerly, were indebted to the West of Scotland Agricultural College for giving special courses of instruction for milk recorders to meet the Association's requirements. Four special courses were given in 1921—viz., in March, May, August, and December. Only candidates of good character and good general education were selected for these courses. In all, 46 candidates attended, and 41 obtained the certificate.

The Executive Committee were able to purchase sufficient supplies of milk-testing apparatus for local societies at slightly reduced prices compared with the previous year. They obtained the necessary sulphuric acid and amylic alcohol at the prices ruling in 1920.

The new system of surprise check tests, introduced in 1920, was continued in 1921. The total number of check tests made during the season was 1959, in addition to the double tests made by the North of Scotland Society, making an average of from 3 to 4 check tests per herd. Only 4 herds showed an average for the herd of over 3 lb. milk daily less on the occasion of a check test as compared with the previous day, and in all four instances satisfactory explanations were produced. Only 7 herds showed an average of over 2½ lb. less, including the 4 herds already referred to, and only 16 herds an average of over 2 lb. less. In addition to the surprise check tests arranged for and carried out by the recorders, the Assistant-Superintendent made a number of special check tests of different herds. Results in most instances compared satisfactorily in regard both to milk yields and fat percentages; only in four instances were abnormal differences detected, and these were in fat percentages only.

Further efforts were made in 1921 to obtain additional applications for membership of local societies in 1922, and in all 152 applications were obtained throughout the various districts. This is the largest number of new applications yet obtained in any one year, and, particularly in view of the abnormal slump in market prices, and the poor demand for milk at the end of the year, the result is most encouraging. It should be noted also that a large proportion of the new members are in new districts in the East of Scotland—viz., in the counties of Ross, Inverness, Aberdeen, Forfar, Perth,

Linlithgow, Haddington, Peebles, and Roxburgh. On the other hand, owing probably to the conditions already referred to, there were more than the usual number of resignations—viz., 64, including 29 members who have disposed of their dairy herds. As in previous years, several of the new applicants could not be accommodated in existing or new societies, owing to their being isolated in more or less non-dairying districts.

Further progress was made in the amalgamation of separate local societies into larger county or district societies. In addition to the five districts which effected amalgamations in 1920, the following amalgamations were carried out in 1921 :—

- (1) Central and South Ayrshire Milk Recording Society, employing 7 recorders in 1922.
- (2) Perthshire—10 members in Perthshire have joined with the Fifeshire Society, employing 2 recorders in 1922.

The 44 local societies or circuits of 1921 all desired to continue operations in 1922. But the reduction in the number of check tests per herd to be made in 1922, as compared with 1921, from an average of 4 per herd to 2 per herd, permitted of a considerable increase in membership on each recorder's circuit, and necessitated an extensive rearrangement of members on each circuit, with a corresponding reduction in the number of circuits. This rearrangement was successfully carried out. The whole of the members recording in 1922, and all the new applicants that could possibly be accommodated, were included in 40 societies or circuits.

Thus the number of local societies or circuits already formed for 1922 is 40. The number of herds tested in 1922 will be approximately 740, and the number of cows tested approximately 31,000, compared with 668 herds and 27,700 cows in 1921.

ANALYSES FOR MEMBERS DURING 1921.

By Dr J. F. TOCHER, Aberdeen, Analyst to the Society.

THE number of samples analysed by me during 1921 was 221, of which 90 were fertilisers, 28 were feeding-stuffs, 22 were waters, and 81 were miscellaneous. The miscellaneous samples included 17 milks, 7 soils, 16 examinations for poisons, and 41 other examinations. The following table shows the numbers and nature of the samples analysed during the last six years :—

TABLE I.

	1921.	1920.	1919.	1918	1917.	1916.
Fertilisers . . .	90	56	44	53	58	47
Feeding-stuffs . .	28	42	41	41	36	34
Waters . . .	22	21	25	19	12	22
Miscellaneous . .	81	89	45	23	46	41
Total . . .	221	208	155	136	152	144

TABLE II.

FERTILISERS.

General.—The fertilisers examined were divided as follows :—

Compound fertilisers, &c. .	27
Concentrated potash fertilisers .	11
Superphosphates . . .	11
Sulphates of ammonia . . .	4
Nitrate of soda . . .	1
Slags . . .	12
Bone-meals . . .	3
Precipitated phosphate . . .	1
Slag phosphates . . .	2
Fish guano . . .	2
Peruvian guano . . .	1
Limes and limestones . . .	15
	<hr/> 90

The following table shows the average composition of the potato and turnip mixtures for 1921 :—

TABLE III.

AVERAGE COMPOSITION OF COMPOUND FERTILISERS.

	Turnip.		Potato.	
	1921.	1920.	1921.	1920.
Nitrogen	2.98	3.8	6.72	7.6
Soluble phosphate	14.77	15.7	16.73	15.3
Citric soluble phosphate	8.60	5.2	3.22	2.4
Insoluble phosphate	3.95	3.5	2.29	2.0
Potash	2.54	3.0	3.25	3.0
Total phosphates	27.22	24.4	22.24	19.7

These compound fertilisers usually include a guarantee for citric soluble phosphate. As I have pointed out elsewhere, there is no legal necessity for giving a guarantee for citric solubility, either for compound fertilisers or for slags. If a guarantee of citric solubility is given in the case of a slag it must be given in accordance with the official method, but there is no compulsion on the part of a seller to give citric solubility of any fertilisers whatever. What the farmer should ask for is a guarantee of the total amount of phosphate present as tricalcium phosphate, and he should see that the slags and mineral phosphates are up to the guarantee in total phosphate. Two samples of slag were found to be below the guarantee in total phosphate to the extent of 1 per cent in the one case and $2\frac{1}{2}$ per cent in the other. Citric solubility is merely an empirical test indicating the presence or absence of phosphates, fluorides, alkalis, and other substances, and the extent to which the sample had been finely ground. It is applicable only as a comparative test on fertilisers containing the same proportions of the same extraneous substances. It is not necessarily a test of availability of the phosphate to the plant in the soil. If the sample is finely ground and has a low citric solubility, this low solubility may be caused by the presence of fluorides and of alkaline material which neutralises the citric acid, and therefore prevents direct action of the acid on the phosphate. It is not a test showing that the phosphate is a more or less soluble phosphate. It has yet to be shown that phosphates of a low citric solubility are not utilised by the plant as readily and as efficiently as phosphate from the highest citric soluble slags. There is at present on the market a phosphatic fertiliser which is neither a basic slag nor a mineral phosphate, but a mixture of both, and is termed "slag phosphate." Slag phosphate is just a mixture of poor slag and rich mineral phosphate. Slag is a word to be conjured with, and possibly the mixing of small quantities of poor-grade slags with large proportions of rich

mineral phosphates is a useful way of disposing of slag at the present time. It may be of interest to show the composition of the slags analysed during the year 1921. It will be seen that the total phosphate present varied from 19·8 to 42·9 per cent, and that the amount of phosphate dissolved by citric acid per cent of the total amount, using the official test, varied from 13·85 to 94·77 per cent. The following table shows the composition of the slags :—

TABLE IV.

No.	Citric solubility.	Total phosphate.	Citric solubility per cent of total phosphate.	Fineness.
1 . .	16·76	19·76	84·82	74·0
2 . .	21·34	25·69	83·07	85·6
3 . .	29·27	40·98	71·43	89·8
4 . .	34·13	42·93	79·50	86·3
5 . .	2·65	19·13	13·85	82·7
6 . .	8·10	17·87	45·32	86·6
7 . .	30·44	32·12	94·77	80·3
8 . .	7·26	29·74	24·41	86·0
9 . .	16·90	21·64	78·10	84·0

Of the potash fertilisers examined, one was a sample of sulphate of potash containing 42·8 per cent of potash, a sample of muriate of potash containing 53·3 per cent of potash, and a sample of kainit containing 14·9 per cent of potash. Farmers are asked to note that in getting a guarantee for a potash fertiliser they should decline to accept a guarantee in terms of sulphate of potash. The seller must state the amount of potassium oxide present. If the sample is stated in terms of sulphate of potash, it looks as though it contained a higher percentage of potash than it really does contain. Samples of fertilisers continue to be received, in which the amount of fertilising constituent present is stated in terms of a maximum and minimum. This particularly applies to superphosphate. The terms of the Act are clear. The seller must guarantee the exact proportion of the particular constituent actually present and not an approximation. For example, if a superphosphate contains 23 per cent of tricalcium phosphate, it would be wrong to state that it contains from 22 to 24 per cent. The Ministry of Agriculture and Fisheries, in their leaflet No. 335, are among the offenders who state the maximum and minimum proportions of potash present in the potash manures instead of stating the exact proportion present in each case. If a buyer is offered kainit containing 14 to 16 per cent of potash, or a potash salt containing 20 to 22 per cent of potash, he should take that to mean that the

kainit contains 14 per cent of potash and the potash salt contains 20 per cent of potash. Trade circulars sometimes state the proportions of ammonia and sulphate of potash in the fertilisers offered for sale, but in selling, the constituents nitrogen and potash and not ammonia and sulphate of potash are invoiced. In order to avoid misleading the buyer, it seems necessary that sellers should avoid stating the proportions of ammonia and sulphate of potash. The substances invoiced should be the substances circularised.

The following table (Table V.) shows the composition of each of the compound fertilisers analysed during the year :—

TABLE V.

No.	Nitrogen.	Soluble phosphate.	Citric soluble phosphate.	Insoluble phosphate.	Potash.
1	3.51	10.40	9.15	5.59	2.14
2	5.17	16.20	3.77	2.82	3.00
3	1.63	6.49	10.69	6.63	1.53
4	7.27	13.62	3.64	3.55	2.64
5	8.51	19.02	1.65	1.70	3.20
6	6.98	18.23	4.39	1.01	2.87
7	8.51	18.25	1.58	2.54	3.22
8	3.28	10.86	8.59	9.19	2.71
9	2.55	18.25	2.42	4.12	1.80
10	4.36	15.11	3.88	2.03	5.32
11	8.08	12.46	0.94	0.95	3.20
12	5.19	18.23	2.54	1.75	5.14
13	7.44	16.51	4.75	1.11	2.54
14	6.31	17.32	3.57	2.40	2.67
15	3.81	15.18	5.97	7.59	2.55
16	4.32	14.17	3.18	3.00	3.58
17	2.91	21.37	2.48	1.01	2.39
18	6.24	16.66	3.65	2.38	2.51
19	2.52	12.53	13.86	5.24	3.09
20	4.95	19.06	2.80	1.95	5.75
21	5.49	20.70	3.26	2.50	1.54
22	3.58	16.90	6.02	1.60	1.35
23	3.74	21.92	0.42	1.19	9.05
24	1.31	20.94	2.32	2.29	3.70

FEEDING-STUFFS.

The feeding-stuffs analysed included the usual seed-cakes and compound cakes. Unusual samples such as wheat dust and South African white maize meal and herring guano were also examined. In spite of the fact that it has been repeatedly pointed out by myself and by other agricultural chemists that herring guano is not a feeding-stuff, it still seems to be sold as a substitute for white-fish meal. Herring guano con-

tains a large proportion of objectionable herring oil, and should be sold under a different guarantee and a different name from "white-fish meal."

The following table (Table VI.) shows the results of analyses of the feeding-stuffs analysed during 1921 :—

TABLE VI.

COMPOSITION OF FEEDING-STUFFS ANALYSED DURING 1921.

	Oil.	Albumin-oids.	Soluble carbo-hydrates.	Fibre.	Ash.	Mois-ture.	Silica.
Mixed cake . . .	9.53	27.50	33.70	12.57	6.17	10.13	1.09
Pig meal . . .	7.37	16.37	46.16	13.03	4.90	12.17	1.00
Cocoa shells . . .	4.10	17.06	44.25	18.22	9.37	7.00	1.57
Palm kernel meal . . .	7.24	17.25	31.64	28.86	4.85	10.66	0.90
Rice flour . . .	0.73	8.00	78.56	0.10	0.61	12.00	...
Bean meal . . .	1.96	22.19	...	...	...	...	...
Dried grains . . .	7.42	21.94	37.09	19.63	4.37	9.55	2.34
do. . . .	6.67	17.75	48.84	14.60	3.29	8.85	1.39
do. . . .	7.87	19.50	42.88	17.67	2.50	9.58	1.50
do. . . .	4.30	19.06	45.54	18.20	3.65	9.25	2.00
Oatmeal . . .	7.53	10.87	68.28	1.97	1.85	9.50	0.27
Oat dust . . .	4.38	8.00	47.16	23.68	8.00	8.78	5.35
Meal seeds . . .	4.07	7.50	59.11	16.57	3.35	9.40	1.70
Sussex ground oats . . .	5.13	9.06	63.58	10.03	2.60	9.60	1.15
Chicken meal . . .	2.25	14.38	70.65	1.25	2.16	9.31	2.30
Alesco . . .	4.22	15.31	37.49	12.53	18.41	12.04	3.35
Atlantic condiment (from seaweed) . . .	4.98	13.06	41.69	10.68	17.69	11.90	2.09
Java cocoanut cake meal . . .	10.35	19.81	36.63	16.71	6.23	10.27	0.54
Lentil offal meal . . .	1.92	21.06	42.61	18.98	6.69	8.74	2.26
Feeding meal . . .	7.94	15.62	42.94	13.59	9.60	10.31	2.50
Lambs' food 1 . . .	5.13	16.81	47.62	14.67	4.20	11.57	0.80
Lambs' food 2 . . .	5.07	16.37	52.25	11.13	3.85	11.33	0.57
Fish meal . . .	12.18	46.75	...	...	18.82	19.11	0.25
Cotton seed meal . . .	9.21	41.88	26.26	7.73	5.83	9.09	0.08
do. . . .	8.08	40.12	25.52	10.64	6.46	9.18	0.06
Oat husk . . .	0.53	1.31	51.25	33.54	4.33	9.04	3.77
Wheat dust . . .	4.03	14.19	44.18	15.50	11.93	10.17	6.15
South African white maize meal . . .	4.17	7.75	73.02	2.43	1.15	11.48	...

SOILS.

The undernoted table (Table VII.) shows the results of analyses of several soils for "available" fertilising constituents and for the proportions of total plant constituents. In sample No. 3, 19.3 per cent of the total phosphate was found to be "available." The corresponding figure for potash was 5.9 per cent. Samples 1, 4, and 5 were in need of lime, and No. 4 had a very high proportion of stones, but there was no marked deficiency in fertilising constituents. Samples 6 and 7 were low in nitrogen, and No. 1 had a high proportion of fine earth, but was low in phosphate.

TABLE VII.

SOILS ANALYSED DURING THE YEAR 1921.

<i>Mechanical—</i>	1	2	3	4	5	6	7
Stones . . .	1.0	22.9	21.6	55.5	52.4	3.8	4.5
Sand . . .	1.9	2.9	4.4	15.6	16.0	2.4	2.0
Fine earth . .	97.1	74.2	74.0	28.9	31.6	93.8	93.5
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Chemical—</i>							
Moisture . . .	2.5	4.3	2.33	4.1	3.4	1.5	1.5
Loss on ignition .	6.29	7.12	6.64	15.71	10.64	4.62	...
Nitrogen . . .	0.195	0.23	0.17	0.42	0.22	0.13	0.12
Available phosphate	0.014	0.030	0.023	...	...	0.037	0.037
Lime . . .	0.140	0.260	0.280	...	...	0.362	0.320
Potash . . .	0.019	0.022	0.015	...	...	0.015	0.015
Magnesia . . .	0.034	0.031	0.016	...	...	0.052	0.051
Lime requirement .	0.232	0.168	0.020	0.264	0.25	nil	nil
Total phosphate .	...	...	0.119	0.230	0.171	...	...
„ lime . . .	...	...	0.475	0.475	0.275	...	...
„ potash . . .	...	...	0.256	0.468	0.555	...	...
„ magnesia . . .	...	...	0.377	1.027	0.530	...	...

The proportion which “available” plant fertilisers bears to the total amounts present in the soil varies greatly, even in samples from the same areas. In the case of phosphates the “available” phosphate (*i.e.*, amount dissolved by a 1 per cent solution of citric acid) varied from 0.5 per cent to 59.3 per cent, while the proportion of “available” to total potash varied from 0.7 to 6.5 per cent. It has not been shown that the citric solubility of fertilisers *in soils* has any direct relationship to availability or fertility. It is difficult to see how there can be any relationship, since varying amounts of carbonates and other substances are present in soils, and therefore are partially or wholly decomposed by citric acid. More reliable information of the fertility of a soil can be obtained by an analysis of the total fertilising constituents, by determining the proportions of carbonic acid and the like, and by ascertaining the lime requirement of the soil.

WATERS.

The following table (Table VIII.) shows the nature of the variations in quality of the 22 samples of water analysed during the year:—

[TABLE VIII.]

TABLE VIII.

QUALITY OF SAMPLES OF WATERS.

Quality of samples	No.	Remarks.
Excellent	2	...
Good	2	...
Fair	1	...
Doubtful	3	...
Bad	8	Chemically and bacteriologically
Dissolved lead	1	...
Medicinal	1	No medicinal properties
Iron water	2	1 grain per gallon
Bacteriologically bad	2	...
<hr/>		
22		

The quality of a water is judged from two separate stand-points: (1) from the point of view of chemical analysis, and (2) from its bacterial content. Small proportions of such substances as salt are usually present in all waters. If the proportion becomes high, then the water is brackish in character, and is unsuitable for cooking and drinking purposes. The water may also contain nitrogenous substances in small quantity, which, if taken, may not directly affect health; but the presence of nitrogenous substances in a water is usually an indication of the extent to which surface water and sewage has found its way into the supply. It is also customary to determine the number and the nature of the bacteria present in a water. No water is free from these micro-organisms, which are usually of a harmless character. There is one organism, however—the colon bacillus—which is always present in sewage, and which if present in large numbers in a water renders it unfit for human use. The absence of this organism indicates a water of high bacterial purity. Bacteriologists now measure the purity of water by ascertaining whether the number of colon organisms present in a sample is small—a drop in the bucket—or whether the water is more or less swarming with these organisms. It is natural in water supplies at farms to find great variations, both in the chemical and bacteriological content of a water.

MILKS.

The proportion of butter fat in the 17 samples of milk varied from 3 to 6 per cent, while the proportion of solids not fat varied from 8·3 to 9·9 per cent. A very exceptional sample was found to contain 6 per cent of butter fat and 9·9 per cent of solids not fat. As a general rule, when a sample is above the average in butter fat, it is above the average in solids not fat.

The following table (Table IX.) shows the proportions of butter fat and solids not fat in the 17 samples. A sample of cream was found to contain only 14 per cent of butter fat. It seems highly necessary that an official standard should be instituted for cream sold to the public.

TABLE IX.
BUTTER FAT AND SOLIDS NOT FAT IN 17 SAMPLES
OF MILKS.

No.	Butter fat.	Solids not fat.
1	4.3	8.4
2	6.0	9.9
3	3.0	8.8
4	3.4	8.7
5	3.3	8.7
6	3.3	8.7
7	3.5	9.2
8	3.1	9.3
9	3.4	9.0
10	3.4	8.8
11	4.7	8.5
12	4.8	8.4
13	3.1	9.1
14	4.9	8.4
15	5.1	8.3
16	4.2	9.0
17	3.3	8.7

The attention of members is drawn to the article on "Some Problems of the Milk Industry," by Gerald Leighton, M.D., F.R.S.E., which appeared in the 'Transactions' of the Society last year. The Scottish Interdepartmental Committee on Milk, which commenced its deliberations on the 9th June 1920, is expected to issue a report at an early date. This is the first official inquiry into the milk problem in Scotland, and the report, when published, should be closely scrutinised and studied by dairy farmers, and indeed by the general public. The remit to the Committee was as follows:—

To report upon the Laws, Regulations, and Procedure governing the Sale of Milk in Scotland, and to recommend such alterations as may be thought necessary. The special points to which the attention of the Committee is directed are:—

- (1) The presumptive or legal standard for milk.
- (2) The question of warranty of composition.
- (3) Methods of sampling and of making analyses.
- (4) Court of trial and the incidence of expenses.

Any other question arising from the above.

In order to aid them in their deliberations the Committee has sanctioned the carrying out of an investigation into the

composition of 1000 samples of milk from 1000 individual cows and otherwise, in the hope that the results will be of practical value in guiding them in their answers to the queries officially placed before them.

POISON CASES.

Five samples of feeding-stuffs were analysed for poisons, while eleven samples of stomach and bowel contents of horses, cattle, pigs, and poultry were examined for the same purpose. Of these, four were cases of lead poisoning in bullocks. In one case red lead was found in the grass field where the bullocks became ill. There were two cases of arsenical poisoning in pigs. A large proportion of arsenic was found, not only in the food, but also in the stomachs of the pigs. A remedy for rats was analysed, because it was said to be an effective rat poison. It was claimed, however, to have a mysterious composition, unfathomable by chemical analysis. The sample turned out to be ordinary white arsenic. Farmers and others should be on their guard on every occasion on which they are represented as being rich beneficiaries of poor but benevolent and disinterested strangers.

DANGEROUS DRUGS REGULATIONS.

It is well known that these regulations have been framed, as everybody is aware, in order to prevent as far as possible the use of morphine and cocaine to the detriment of health. It should be mentioned, however, that the drugs to which the Regulations apply include cocaine, morphine, and opium, containing, in the case of cocaine, more than one-tenth per cent cocaine, and, in the cases of opium and morphine, more than one-fifth per cent of morphine. The idea of adding asafoetida to laudanum in the hope that this would prevent its illegal use has been abandoned. It meant punishing the animal because it was ill, and reminded readers of Butler's works of the punishment of death meted out by the Erewhonians to all who by chance suffered from pulmonary tuberculosis. The Regulations in their final form still prohibit the purchase and use of opiates by farmers, unless specially authorised under Section 7 of the Regulations, which names the classes of persons who may have drugs in their possession. These include persons licensed by the Secretary of State to be in possession of the drug, and also persons to whom the drug was supplied for their use by medical practitioners or veterinary surgeons. If the Regulations were read in conjunction with the Committee's Report, it is clear that some

form of licence would require to be in the possession of the farmer when he applied after the 1st September 1921 for a small supply of an opiate for stock use. As the law formerly stood, any farmer known to the authorised seller could purchase the requisite amount of the drug by signing for the drug and stating the object for which it was to be used. This procedure would still be necessary, but in addition to signing for the drug and stating the object for which it was to be used, the farmer would now require to show evidence that he was licensed to procure and use the drug before the purchase could be made. The Regulations are intended to prevent people contracting the opium or cocaine habit, and it is hoped that it will attain this end. There is evidence, however, to show that dilute solutions of these drugs are now being prescribed and bought for habitual use in a manner which conforms to the present Regulations. This is not a matter of interest to agriculturists as such, and I think the Regulations as they stand will enable stockowners to obtain the remedies they require as promptly as possible, and so help to preserve the health of their stock.

THE CEREAL AND OTHER CROPS OF SCOTLAND FOR 1921, AND THE WEATHER OF SCOTLAND IN 1921.

THE CROPS.

THE following comparison of the cereal and other crops of 1921 with those of the previous year has been prepared by the Secretary of the Society from answers to queries sent to leading agriculturists in different parts of the country.

The queries issued by the Secretary were in the following terms:—

1. What was the quantity, per imperial acre, and quality of grain and straw, as compared with last year, of the following crops? The quantity of each crop to be stated in bushels. What quantity of seed is generally sown per acre?—(1) Wheat, (2) Barley, (3) Oats.
2. Did the harvest begin at the usual time, or did it begin before or after the usual time? and if so, how long?
3. What was the quantity, per imperial acre, and quality of the hay crop, as compared with last year, both as regards ryegrass and clover respectively? The quantity to be stated in tons and cwts.
4. Was the meadow-hay crop more or less productive than last year?
5. What was the yield of the potato crop, per imperial acre, as compared with last year? The quantity to be stated in tons and cwts. Was there any disease? and if so, to what extent, and when did it commence? Were any new varieties planted, and with what result?
6. What was the weight of the turnip crop, per imperial acre, and the quality, as compared with last year? The weight of the turnip crop to be stated in tons and cwts. How did the crop braird? Was more than one sowing required? and why?
7. Were the crops injured by insects? State the kinds of insects. Was the damage greater or less than usual?
8. Were the crops injured by weeds? State the kinds of weeds. Was the damage greater or less than usual?
9. Were the pastures during the season of average growth and quality with last year?
10. How did stock thrive on them?
11. Have cattle and sheep been free from disease?
12. What was the quality of the clip of wool, and was it over or under the average?

From the answers received, the following notes and statistics have been compiled:—

EDINBURGH DISTRICT.

MID-LOTHIAN. *Wheat*—About 44 bushels per acre; straw rather more than last year; 4 bushels per acre seed sown. *Barley*—36 to 40 bushels per acre; straw less than last year; 3 bushels per acre seed sown. *Oats*—44 to 48 bushels per acre; straw less than last year; 5 bushels per acre seed sown. *Harvest* began about 10 days earlier than usual; very damp weather, and a lot of rain after cutting was well advanced in early districts; this discoloured the grain badly, especially oats, —barley not nearly so much discoloured. *Wheat* shed badly at leading in after so much rain in stook. *Hay*—Not more than 2 tons per acre; quality very good; second crop, where taken, very light, being thin on ground. *Meadow-hay*—Not much grown. *Potatoes*—7 tons per acre; possibly about same as last year; not much disease; a good few new “immune” varieties planted, but gave very varied results, and quality of these, as a general rule, compared unfavourably with the older varieties such as “Arran Chief,” &c. *Turnips*—15 tons per acre; early sown braided well, but later sown, owing to the drought, came away very patchy and took a long time to come to the thinning. As a general rule one sowing was sufficient. *Insects*—No damage. *Weeds*—Turnip fields that had not been early thinned got very dirty during harvest time, as the rain braided the charlock or yellow weed which had lain dormant during the summer drought; not much damage done. *Pastures*—Not so good owing to dry weather during summer, but a tremendous amount of keep during autumn. *Live Stock* thrived fairly well, where an abundant supply of water was available. A good deal of lameness among sheep in late summer and early autumn, probably caused by wet sodden ground. *Clip of wool* rather under an average.

WEST LOTHIAN. *Wheat*—Say 52 bushels; straw good and plentiful; seed sown, 4 bushels per acre. *Barley*—Say 48 to 52 bushels; straw good but scarce; seed sown, 4 to 5 bushels per acre. *Oats*—48 to 52 bushels; straw good but scarce; seed sown, 5 to 6 bushels per acre. *Harvest* early, about 2 weeks before the usual time; early varieties of oats suffered a little owing to wet weather before harvest; ordinary and late varieties of grain were secured in good condition. *Hay*—Owing to dry season hay not so large a crop—say 2 tons per acre; this was secured in good condition. *Meadow-hay*—Very little grown. *Potatoes*—Earlies, say 4 tons per acre; late, say 6 to 8 tons per acre; potatoes suffered from second growth owing to the dry summer and wet autumn following; very few new varieties grown. *Turnips*—20 tons per acre; quality good; braird slow in coming owing to dry weather; very little resowing required. *Insects*—Damage by insects less than usual. *Weeds*—Damage by weeds less than usual; more easily kept down owing to dry season. *Pastures* very poor owing to dry season. *Live Stock* did well where the pastures were not fully stocked; most pastures were only half stocked. Cattle and sheep free from disease. *Clip of wool*—Average.

EAST LOTHIAN (Lower District). *Wheat*—40 to 48 bushels; the best cereal in a year when crops were miserable owing to drought; quality seriously damaged by rain at harvest, and samples worse than anything since 1872—blackened and sprouted. *Barley*—A wretched

crop on all late-ploughed turnip land; some fields not 8 bushels per acre; average might be called round 24 bushels per acre. Rain in harvest added to loss, and all samples much blackened and sprouted; the net return to grower would, on average, never be less, except when prices were at bottom. *Oats* also a failure owing to drought, and then rain in harvest; yields very variable, perhaps 36 bushels might be average; quality poor owing to drought and wet harvest. *Harvest* very early; commenced on 27th July; rain then came, and whether crops were in stook or were uncut they were damaged alike; later districts had better weather, as it improved towards the end of August. *Hay*—Very light crop owing to drought; $1\frac{1}{2}$ tons per acre a good crop. *Meadow-hay*—Not much grown. *Potatoes*—Yields very variable; late varieties a fair crop—up to 8 tons; general run of crops about 6 to 7 tons; a little disease in some varieties; all “immune” varieties poor in quality except “Golden Wonder.” *Turnips*—A very light crop owing to drought; some fields never braided; yield running about 14 tons. *Insects*—Not much damage. *Weeds*—No injury by weeds; dry summer enabled farmers to get on with cleaning. *Pastures*—Bad grazing year. *Live Stock*—Very little keep. Cattle and sheep free from disease. *Clip of wool*—A good clip.

BORDER DISTRICT.

BERWICKSHIRE (Merse). *Wheat*—40 to 50 bushels; the best crop of the year; both autumn and early spring-sown wheat did well, grain being an excellent sample, and straw above the average; seed, $2\frac{1}{2}$ to 4 bushels per acre. *Barley*—32 to 48 bushels; a very uneven crop; where early sown above the average, but where the crop was not established before the dry weather set in there was a second growth which spoiled the sample; straw very short; seed, 2 to $3\frac{1}{2}$ bushels. *Oats*—38 to 50 bushels; about an average crop in parts, but in others almost a failure, with a shortage of straw all over. *Harvest* began one to two weeks earlier than last year, but lasted more than twice the usual period owing to grain ripening at long intervals; regular harvest hours were never worked for more than a day or two at a time; the weather was excellent. *Hay*—Crop was very good; 2 to 4 tons per acre and got without a shower. *Meadow-hay*—A lighter crop than seeds hay, but secured in excellent order; $1\frac{1}{2}$ to 3 tons. *Potatoes*—Below the average owing to lack of moisture; little or no disease. *Turnips*—A very variable crop; early-sown turnips were an excellent crop of first-rate quality, up to 50 tons per acre; where sown after land had become dry they were either patchy or almost a complete failure; some seed lay for five weeks without germinating; second sowing was useless. *Insects*—Damage by insects was not noticeable. *Weeds*—Charlock seemed to thrive where turnip seed did not germinate. *Pastures*—Were very bare in mid-summer, but came away well after the rain, and there was an abundance of autumn keep. *Live Stock*—All live stock suffered for a time owing to pastures being bare. There was an absence of disease among cattle and sheep. *Clip of wool*—Quality above the average, and quantity good.

BERWICKSHIRE (Lammermoor). *Wheat*—Practically none grown. *Barley*—A very light crop owing to the excessive drought of June and first half of July; a great deal, on later-sown fields, did not spring at all till well on in July, and showed green among the earlier heads at harvest; yield 20 to 22 bushels; the early crops were the best, but were damaged by wet weather in the beginning of harvest; quality of both

grain and straw poor; seeding 3 to $3\frac{1}{2}$ bushels per acre. *Oats* were a light crop as to bulk; straw, though of good quality generally, was only from 12 to 15 cwt. per acre; the yield of grain, though much below an average, was good for the bulk of crop, and might average about 28 bushels of good quality; seeding about 4 to 6 bushels according to variety sown. *Harvest* about 10 days earlier. *Hay*—On fields that were stocked early, which is the way with most hay fields in this lamb-breeding district, there was a very poor crop of hay, say about 12 to 15 cwt.; fields that were not stocked and had the benefit of early growth might be about double that amount; they were all prematurely ripe, and were stacked in record time after being cut. *Meadow-hay*—Poor crops all round, and cut and stacked in record time; about half last year's crop. *Potatoes*—Potatoes when on softer land and where they could spring at once when planted, became an excellent crop, and even in cases when they came away badly at first, exceeded expectations and were generally sound, and were taken up in prime condition if not taken up too early; mostly "immune" varieties planted where grown for sale; about $4\frac{1}{2}$ to $5\frac{1}{2}$ tons. *Turnips*—A great many turnips braided badly, and produced only a disappointing crop, say about 12 tons; those that came away at once proved an average crop of about 18 tons. *Insects*—No insect damage to speak of. *Weeds*—The dry summer made the weeds easily killed, and when rain did come growth was so strong and rapid that they were mostly choked. *Pastures*—In June and July pastures were most unusually bare and burned up; after the rain came the growth was equally abnormal. *Live Stock*—Few farmers in this district have ever seen stock do so well on brown burned pastures; but it was not till the rain had come and gone and the dry September and October had come that stock did really well; there was too much growth for a few weeks. Cattle and sheep free from disease. *Clip of wool*—Wool was considerably better than last year both in weight and quality.

ROXBURGHSHIRE. *Wheat*—Good crop, but little grown. *Barley*—A very variable crop; some good, and a great deal very short and light; probably about 26 bushels, and straw 14 cwt.; seed about $2\frac{1}{2}$ to 3 bushels; where early sown, much the best; owing to drought, lacked moisture to braird it and came very irregularly. *Oats*—Poor crop on much of the second-class and inferior land, but good on really good corn land; yield very irregular, perhaps 30 to 32 bushels; 15 cwt. straw. *Harvest*—Early harvest owing to the drought—quite ten days earlier than usual. *Hay*—About 30 cwt. *Meadow-hay*—Very light; in many places it was never cut. *Potatoes*—About 6 tons per acre; no disease. *Turnips*—Looked well to begin with, but owing to the drought got a check; mildew affected the yellow turnips especially and did much harm; swedes, about 16 tons to the acre; yellows, half a crop. *Insects*—No damage to any extent by insects. *Weeds*—Did not suffer from weeds. *Pastures*—There was a plentiful supply of grass at the beginning of the season, but the drought was pretty severe and pastures got a good deal burned except where wild white clover had been sown; these stood the drought very well. *Live Stock* did well, but there was a great scarcity of cattle. Cattle have been free from disease and grazed well; sheep were healthy, but as usual had to pay considerable toll to the diseases "loup-ill," "braxie" and "scrapie"; little sickness. *Clip of wool*—Good quality, but hardly up to an average.

SELKIRKSHIRE. *Wheat*—None grown. *Barley*—Moderate crop; good quality; 34 bushels per acre. *Oats*—A very unequal crop, but well got,

especially the later districts; yield very good, 40 bushels; the new varieties of oats no doubt must be credited with this excellent result; a similar crop forty years ago would have fallen far short of this yield. *Harvest*—Early; would begin about ten days earlier than usual. *Hay*—35 cwt.; good quality. *Meadow-hay*—20 cwt.; good quality, except in high late districts. *Potatoes*—8 tons; good quality; practically no disease. *Turnips*—Swedes very good; 20 to 24 tons; yellows a good crop where early singled, but late fields a poor and unsatisfactory crop, varying from 8 to 16 tons; the baird was slow and unequal owing to the dry season. *Insects*—Nothing unusual to report. *Weeds* gave no trouble owing to the very dry season. *Pastures*—A proportion were much damaged by drought, but in the whole county about 50 per cent did not suffer any damage. *Live Stock*—On early pastures stock suffered considerably. Cattle and sheep free from disease. *Clip of wool*—A good clip, secured in fine condition; but such were the market prices that damaged or dirty wool would not pay expenses of marketing.

PERBLESSHIRE. *Wheat*—Very little grown, if any. *Barley*—30 to 40 bushels; 10 to 15 cwt. straw; seed, 4 bushels per acre. *Oats*—30 to 50 bushels; 10 to 17 cwt. straw; seed, 5 bushels per acre. *Harvest* began one week earlier, and the late districts were favoured with best weather and secured crops in splendid order. *Hay*—Ryegrass lightest crop for some years; 12 to 20 cwts. per acre, and some hardly worth cutting; secured in splendid order. *Meadow-hay*—Very light crop; 14 to 20 cwt. per acre, most of which was well secured. *Potatoes*—7 to 8 tons per acre; quality good, but there are complaints of not keeping well. *Turnips*—About half a crop in some places; those sown before end of first week in June did all right, but very few sown after that date came to more than half a crop; 8 to 15 tons per acre. *Insects*—Little or no damage done. *Weeds*—Little damage by weeds, as the dry weather gave farmers a good chance to master them. *Pastures* grazed well in early part of season, but were badly burned up later. *Live Stock* did fairly well. Cattle and sheep had very little disease. *Clip of wool*—Quality good; much the same as last year.

DUMFRIES DISTRICT.

DUMFRIESSHIRE (Annandale). *Wheat*—Very little grown. *Barley*—Grain a full average of last year's crop, but better in colour; straw short of last year's yield; grain, 36 bushels per acre; straw, 18 cwts. *Oats*—Sowing began about usual time, the end of March or first days in April. A favourable seed-time followed, and the work was finished about the middle of April. Showers in the early part of May favoured the baird, giving it a good start before the long spell of dry weather set in. This crop varied greatly throughout the district. On light or sandy soils the crop was short, both in grain and straw; but where the soil was what is known as "cold-bottomed"—that is, lying on "till" or boulder clay—the yield in grain would reach last year's average, or perhaps a little over. Average on light soils may be put at 30 bushels per acre; straw, 14 cwt. On heavier soils, grain about 40 bushels; straw, 18 cwt. Seeding, 4 to 6 bushels per acre of sandy and potato; 7 to 8 of the new varieties. When drilled, 1 bushel per acre less. *Harvest* began from 12th to 15th August, or about three weeks before the usual time. *Hay*—Owing to dry summer the ryegrass hay crop was much lighter than

that of last year, but the quality was unusually good. It was got into ricks without a drop of rain. Generally it was well mixed with clover. In this respect it was much better than last year, which was a wet season with low temperature throughout, very unsuitable for clovers. Like grain crops, the hay crop varied greatly and for the same reason. Some fields of clayey land (and "hained" during the winter) yielded up to 2 tons per acre, but this was exceptional. The average would probably work out at from 20 to 23 cwt. per acre. *Meadow-hay*—Meadow and lea hay also less than last year, but a better crop than ryegrass; this crop, being closer in the bottom, withstood the drought better. Quality excellent. Average, 25 cwt. per acre. *Potatoes*—Promised well until about the middle of July, when the long-continued dry weather seemed to check their growth. Some showers fell about the beginning of August, and thereafter a second growth set in which greatly reduced the yield and injured the quality. Average weight of crop about 5½ tons per acre. Few new varieties were tried. Growers have become somewhat chary of paying fancy prices for "so-called" immune varieties and then finding half the resulting crop diseased. This season's crop did not suffer much from disease. It differed greatly in this respect from that of 1920. *Turnips*—Owing to dry season turnips seem to have been a partial failure in most districts throughout the country. In Annandale, however, turnips were the crop of the season. The average weight of the crop would be more than double that of last year, when the crop was soured by the heavy rainfall. This year the plants received a good start. No second sowing was needed. In a very short time the shaws met between the drills, and this crop seemed the only crop that did not suffer from the dry weather. A poor crop was rarely seen. There were no complaints of finger-and-toe, the crop being exceptionally sound. Average weight, 22 to 25 tons per acre. *Insects*—Turnip-fly and grub in oats almost unknown. Wire-worm was noticeable, but not to any great extent. *Weeds*—Owing to dry season weeds were easily kept down. Damage less than usual. *Pastures* were not of average growth, and suffered from lack of moisture. Fields (in parts) were brown and parched-looking, and especially was this noticeable on thin soils. *Live Stock*—Notwithstanding the scarcity of grass, stock seemed to thrive, and even on burnt and parched lands it was remarked that stock did not receive any check, and it was noticeable at the autumn sales that seldom had stock (especially cattle) been seen in such good condition. Both sheep and cattle have generally been free from disease. The hot dry summer favoured udder troubles amongst dairy stock, but this was not so troublesome as in 1920. Braxy in sheep (usually so prevalent in Annandale) did not cause great loss; this is attributed by some farmers to a sound and well-matured turnip crop. *Clip of wool*—Wool, for quality and quantity, would compare favourably with last year's clip, which was over the average.

DUMFRIESSHIRE (Nithsdale). *Oats*—Good crop, but straw very short on sharp light land, owing to summer drought; oats 40 bushels per acre and straw 1 ton; crop braided well and cutting started earlier than usual, but owing to slow harvest weather the crop on early and late farms was finally secured about the same time; 5 to 6 bushels sown per acre. *Hay*—Average crop; quality excellent, and mostly secured without a shower of rain; 35 cwt. per acre. *Meadow-hay*—Under average, and being secured during broken weather, suffered in quality; 25 cwt. per acre. *Potatoes*—An excellent crop and very little disease; 10 tons per acre; a few new varieties planted; results satisfactory. *Turnips*—Heavy crop, but many unsound turnips among soft and yellows; 26 tons

per acre; the crop braided well, and no resowing required. *Insects*—No injury. *Weeds*—No damage to any extent. *Pastures*—Badly burnt during the dry summer on light thin land, but where not affected by the drought the growth was luxuriant. *Live Stock*—Throve very well indeed. Cattle and sheep—No more disease than usual. *Clip of wool*—A heavy clip and of good quality—over the average.

DUMFRIESSHIRE (Eskdale). *Wheat*—None grown. *Barley*—Practically none grown. *Oats*—Quality fairly good. Owing to the severe drought in early summer the straw was very short, and in some places very difficult to get tied as too short for binder. The earliest ripe got very bad weather for harvest, as it rained every day and was so very mild that the sheaves soon began to grow; however, later it turned into first-rate harvest weather, and every one got very well cleared up. Yield about 35 to 40 bushels per acre and straw a very small bulk. Seed sown about 5 bushels per acre of Potato and fully 6 bushels of Yelder, &c. *Harvest*—About a fortnight or three weeks earlier than last year. *Hay*—Ryegrass hay was a lighter crop than last year, owing to the drought, but was got in excellent condition; about 1 ton 8 cwt. per acre. *Meadow-hay*—Very much smaller crop than last year—in fact, very few places would have any more than half the bulk of last year, as the drought came just at the very worst time for meadows. The yield would be about 15 to 20 cwt. per acre. Some meadows which were not cut until after the rain came filled up at an astonishing rate, and cut quite good crops. *Potatoes*—A much better crop than last year; about 8 to 10 tons per acre; very little disease; no new varieties planted; "Great Scot" seems the most popular. *Turnips*—Crop turned out not so bad as was expected; probably about 20 tons per acre; turnips not very big but sound; some fields looked bad with mildew but came out quite well; crop braided well and no second sowing required. *Insects*—Free from damage. *Weeds*—Never less weeds, as the weather was ideal for killing all weeds both at hoeing time and afterwards with horse hoe. *Pastures*—Very badly burned up in early summer, but after the rain came it was astonishing how quickly they grew again; in a week one would not have recognised that the fields were the same. *Live Stock*—Throve extremely well, excepting where short of grass when pastures were burned up. Cattle have been free from disease, and sheep very seldom have been so free; very little braxy, but still some sheep dying from it. *Clip of wool*—Quality very good, but did not weigh so well; price was most disappointing.

KIRKCUDBRIGHTSHIRE. *Wheat*—None grown. *Barley*—None grown. *Oats*—A very variable crop; on sandy land almost a failure, but on retentive soil, where not killed by drought, yields of grain were heavy, running up to 9 quarters per acre; straw generally short—50 per cent below 1920. *Harvest*—About 10 days earlier than usual. *Hay*—Rotation grass, hained for hay, was a fair crop, about 1½ tons per acre; where pastured in spring the yield of hay was negligible. *Meadow-hay*—A good crop, equal to last year, and well got. *Potatoes*—Much inferior to last year as regards early varieties; about 4½ tons per acre. Late varieties yielded well, some sorts running up to 15 tons per acre. *Turnips*—Swedes equal to last year, 20 tons; braided well and not much resowing. *Insects*—No injury. *Weeds*—Corn crops suffered from spurry and other annual weeds, which came up when these crops were checked by drought. *Pastures* were not of average growth and quality—too little rain in early summer. *Live Stock* seemed to thrive well. Cattle and sheep free from disease.

WIGTOWNSHIRE. *Wheat*—40 bushels; grain very good; straw lighter than usual; small acreage; seed sown, 4 bushels. *Barley*—36 to 40 bushels; grain good, straw light. *Oats*—32 to 48 bushels; grain very good quality, straw very light; seed, when sown by drill, about 4 bushels; by hand, 6 bushels. *Harvest*—Earlier than usual; began about middle of August and finished middle of September. *Hay*—In most cases less than 20 cwt. per acre; quality very good. *Meadow-hay*—A fairly good crop and well got. *Potatoes*—A very good crop, about double of last year; from 6 to 10 tons per acre; practically no disease. *Turnips*—A very fine crop; from 18 to 25 tons per acre; quality splendid—quite different from last year; the crop braided well and did well all the time. *Insects*—No damage. *Weeds*—Very few and no damage. *Pastures*—Did well in the early part of the season and in the back-end, but were rather bare in summer, owing to the prolonged dry hot weather. *Live Stock* of all kinds did very well. Cattle and sheep were free from disease. *Clip of wool*—Quality good and quantity about average.

GLASGOW DISTRICT.

AYRSHIRE. *Wheat*—41 to 42 bushels; of good quality, 60 lb. per bushel. Straw about 32 cwt. per acre; 3 to 3½ bushels of seed sown per acre. *Barley*—34 bushels of average quality; 55 lb. per bushel. Straw 22 cwt. per acre; 3 to 3½ bushels seed sown per acre. *Oats*—46 bushels of good quality and harvested in good condition; 39 lb. per bushel. Straw 28 cwt. per acre; 5½ to 7 bushels seed sown per acre. *Harvest*—Two weeks earlier than usual. Weather conditions were rather unfavourable at the start, but improved, and all grain crops were secured in much better condition than in an average of years. *Hay*—1 ton 10½ cwt. per acre, which is less than average, but the excellent weather enabled the crop to be secured in first-rate condition, and the lesser quantity is fully compensated for by the better quality. *Meadow-hay*—1 ton 9 cwt. per acre, and generally of good quality. *Potatoes*—About 6 tons per acre of good quality and free from disease; seed has kept remarkably well in the boxes; only a few small lots of new varieties were planted for experimental purposes. *Turnips*—22 tons per acre of good quality; less disease than usual, and the fine weather enabled the land to be worked and cleaned better than average seasons; very little resowing was found necessary. *Insects*—Much less injury, and this may be accounted for to some extent at least by the cold weather early in the season and the dry weather later on. *Weeds*—No injury to a great extent, and the damage was certainly less than usual. *Pastures*—Were much under average, and stock were short of grass right through the season till autumn set in, when the growth was abnormal and continued till late in the season. *Live Stock*—Throve only moderately well, and in many cases the shortage of grass was responsible for the comparatively slow rate of improvement. Cattle and sheep free from disease generally. *Clip of wool*—Above the average both in quantity and quality.

BUTE. *Wheat*—None grown. *Barley*—None grown. *Oats*—Straw was under average in the south end of the island, on account of the dry season; an average crop in the north end of the island; will all thresh well; quantity about 42 bushels per acre; 6 bushels seed sown. *Harvest*—Began earlier than usual this year; started 18th August and finished 26th September; was very protracted, owing to showery weather and heavy dews in the mornings; crop only in good trim for working in the afternoons. *Hay*—Light crop this year, except in a few favoured situa-

tions; quality good; from 15 cwt. to 1½ tons per acre. *Meadow-hay*—Very little grown; quality good. *Potatoes*—Commenced digging 16th June; yield a great deal under last year; about 3 tons at the beginning and somewhere about 7 tons per acre at the finish; disease not bad, but showed in a few places from the middle of August onwards. "Arran Victory" grown this year, good cropper, and resists the disease well. *Turnips*—Extra good crop this year; 25 to 30 tons per acre; braided well and went straight ahead all the time; very little second sowing. *Insects*—No damage. *Weeds*—No damage; easily kept down on account of the dry season. *Pastures*—Under average, as the season was too dry for most of this island; improved wonderfully towards the end of the season. *Live Stock* did well. Cattle and sheep free from disease. *Clip of wool*—A fair average and quality good.

ARRAN. *Wheat*—None grown. *Barley*—Very little grown. *Oats*—A short crop on sown-out land, owing to the dry weather; secured in good condition; grain say 32 bushels per acre of full average weight; seed sown about 6 bushels per acre. *Harvest*—Earlier than usual, say eight days; finished by 1st October. *Hay*—Short crop, well secured; weight per acre from 20 to 25 cwt.; not the usual amount secured for seed, owing to the foggage being required for grazing, but seed of good quality—heavy weight per bushel. *Meadow-hay*—Very little grown; a fair average crop. *Potatoes*—Crop less than last year; little or no disease; say 5 tons per acre of ware; kept long green; mostly dug in October; very poor demand during winter for seed. *Turnips*—A very good crop, much better than last year; less finger-and-toe; say from 10 to 12 tons per acre; wood-pigeons still destructive to the young plants. *Insects*—Less damage, but still the usual fly doing harm to the plants. *Weeds*—Much less than usual. *Pastures*—Less growth in the early season, but after the rain, made up for an average yield; quality good. *Live Stock*—Quite up to the average. Cattle and sheep free from disease; still foot-rot among sheep on soft land. *Clip of wool*—Over average, both as to quality and weight.

LANARKSHIRE (Upper Ward). *Wheat*—None grown. *Barley*—Only small quantities grown. *Oats*—25 to 40 bushels; more grain and less straw than last year, owing to exceptionally dry summer; 4½ to 6 bushels sown. *Harvest* started 8th August, but not general till a fortnight later; early crops light and wasted by bad weather; late crops good and well got. *Hay*—15 to 30 cwt.; owing to long-continued drought, lighter than usual; fair quality and well secured. *Meadow-hay*—Less productive than last year. *Potatoes*—Rather less than last year, 6 to 8 tons; very little disease; no new varieties. *Turnips*—20 to 30 tons; much the same as last year; braided well; no re-sowing; some finger-and-toe. *Insects*—Damage much the same as usual. *Weeds*—"Charlock" troublesome, owing to dry weather, but got it well killed. *Pastures*—Failed early, owing to drought, but came again and lasted well through the autumn. *Live Stock* thrived well. Cattle and sheep free from disease. *Clip of wool*—Good average quality.

LANARKSHIRE (Middle Ward). *Wheat*—35 to 40 bushels; straw, 30 to 40 cwt. per acre; seed sown, 4 bushels per acre. *Barley*—None grown; *Oats*—35 to 50 bushels; straw, 25 to 35 cwt. per acre; seed sown, 6 to 7 bushels per acre. *Harvest* was exceptionally early; all the crops were secured in good condition; labour a little more plentiful. *Hay*—Rye-grass and clover hay a very light crop; all secured in good condition owing to the extremely dry season; 25 to 30 cwt. per acre. *Meadow-hay*

—Timothy hay was a fair crop, and would average 40 cwt. per acre. *Potatoes* were a good crop, but in some instances, owing to the drought, there was a good deal of "second growth." There was very little disease; a few instances occurred in which wart disease caused difficulties to the growers of the older varieties. The crop would average from 5 to 11 tons per acre, according to the nature of the soil. *Turnips* were a medium crop and there was no difficulty experienced in cleaning the land; the yield would be from 15 to 25 tons per acre; there was not so much "finger-and-toe" as during the previous year. *Insects*—No damage by insects; less grub and wire-worm than in previous years. *Weeds*—Very little injury to crops by weeds. *Pastures* were eaten bare during the greater part of the season. *Live Stock* were healthy, but towards the latter end of the season they fell so much in price as to leave nothing to pay for the grass or cake. There was practically no disease among cattle and sheep. *Clip of wool*—Very little wool in this ward.

LANARKSHIRE (Lower Ward). *Wheat*—50 to 60 bushels; quality very good; straw an average; seed sown, 4 bushels per acre. *Barley*—None grown. *Oats*—Quality good; straw under average. *Harvest* started early. *Hay*—Crop under average, owing to dry weather; quality good; quantity variable. *Meadow-hay*—Less productive. *Potatoes*—An average crop; no disease. *Turnips*—An average crop. *Insects*—Injury less than usual. *Weeds*—No damage. *Pastures*—Under average growth owing to dry weather. *Live Stock* thrived well. Cattle and sheep free from disease.

RENFREWSHIRE. *Wheat*—Average quantity much as usual—i.e., about 38 bushels per acre; quality of grain not quite up to usual standard; straw neither in weight nor quality up to usual; 4 to 5 bushels seed sown. *Barley*—Very little grown. *Oats*—About 48 bushels per acre; quality not up to usual; straw average in quantity (except in lighter lands) but of inferior quality; about 5 bushels seed sown per acre. *Harvest* commenced a week later than usual; was a very long trying one, with the result that few got their crop into stackyard in best of condition, causing the average quantity of both grain and straw to be somewhat inferior. *Hay*—Quantity less per acre than usual; quality very good, resulting from dry weather in May, and perfect weather for hay-making. *Meadow-hay*—Lighter crops than usual; in most cases secured in good condition. *Potatoes*—Yield not up to last year; average about 6 tons per acre; no disease to speak of, and no new varieties worthy of attention. *Turnips*—Although turnips were slow to braird, the result over all would be, both as regards quantity and quality, about the usual average. *Insects*—No injury. *Weeds*—No injury by weeds where land in good heart and attended to. *Pastures*—Quite up to average in quality. *Live Stock* thrived very well—better as a rule than last season. Cattle and sheep free from disease. *Clip of wool*—Quite up to usual both as regards quality and weight.

ARGYLLSHIRE (Lochgilphead). *Wheat*—None grown. *Barley*—None grown. *Oats*—Much the same as last year; grain probably a little more, 6½ bolls; straw a little less, about 13 cwt.; seed sown, 6 bushels. *Harvest* began ten days earlier than last year, about the 22nd August. *Hay*—Ryegrass hay about the same as last year, from 22 to 25 cwt., but better secured. *Meadow-hay*—Much about last year's crop, 1½ ton, and in most cases not well secured. *Potatoes*—Crop about an average; from 5½ to 6 tons; not much disease; no new varieties planted. *Turnips*—Crop about 25 tons; brairded all right, but seemed to suffer from

drought in end of June, and there was a great deal of dry-rot in the roots. *Insects*—Crops not injured by insects. *Weeds*—Crops not injured by weeds to any extent, except turnips, where redshank was very prevalent. *Pastures*—Not so luxurious as some years, but of excellent quality. *Live Stock* thrived very well. Cattle and sheep free from disease. *Clip of wool*—Good quality; rather over the average.

ARGYLLSHIRE (Kintyre). *Wheat*—None grown. *Barley*—Good crop on deep land, but on light land was badly burned owing to dry summer; from 35 to 45 bushels; about 4 bushels seed sown. *Oats*—Not so much straw as last year, but threshing much better. *Harvest*—About the usual time, quite a fortnight earlier than last year. *Hay*—Not so heavy as last year, but extra well got; about $1\frac{1}{2}$ ton per acre. *Meadow-hay*—About the same as last year. *Potatoes*—Very much better than last year; from 6 to 10 tons per acre; a few new varieties planted, with quite good results. *Turnips*—A record crop; from 20 to 30 tons; braided well; no second sowing. *Insects*—No damage to any extent. *Weeds*—No damage by weeds; dry summer made weeds easily killed. *Pastures*—Average growth, except on the shores, where they were badly burned. *Live Stock* thrived well. Cattle and sheep free from disease. *Clip of wool*—Quite an average.

ARGYLLSHIRE (Islands of Islay, Jura, and Colonsay). *Wheat*—None grown. *Barley*—Practically none grown. *Oats*—An excellent crop, and secured in good order. *Harvest*—About a week earlier than the usual time. *Hay*—A lighter crop than last year; a long spell of dry weather retarded growth. *Meadow-hay*—Similar to last year. *Potatoes*—A good crop; 6 to 8 tons per acre. *Turnips*—An excellent crop; 17 to 20 tons per acre; crop braided well; only one sowing required. *Insects*—No injury. *Weeds*—None. *Pastures*—Average growth. *Live Stock* thrived well. Cattle and sheep free from disease. *Clip of wool*—An average one.

STIRLING DISTRICT.

DUMBARTONSHIRE (Upper). *Wheat*—None grown. *Barley*—None grown. *Oats*—About 38 bushels per acre; a fair crop generally, but straw was deficient. *Harvest* began about a fortnight before the usual time. *Hay*—A much lighter crop than last year; weight about 25 cwt. per acre, but quality good. *Meadow-hay* was rather lighter than last year, and some of it was again spoiled by wet weather. *Potatoes* were much about the same as last year—about 5 tons per acre; there was hardly any disease; "Kerr's Pink," a new variety, gave good results. *Turnips* were a good crop; 22 tons per acre; crop braided well, and there was no resowing. *Insects*—No damage by insects. *Weeds* were better kept down than usual owing to the dry weather in the early part of the summer. *Pastures* were good quality, but for a time were rather bare in June and July owing to drought, but they continued fresh till late in the year. *Live Stock* thrived very well. Cattle and sheep free from disease. *Clip of wool*—A good clip, but barely as heavy as last year.

DUMBARTONSHIRE (Lower). *Wheat*—About 40 bushels per acre; owing to the dry summer grain and straw were above the average quality; seed sown, from $3\frac{1}{2}$ to 4 bushels. *Barley*—Little or none grown. *Oats*—About 42 bushels; straw less weight than last year, but well got; seed sown, from 5 to 6 bushels, with drill a bushel less. *Harvest*—About a week earlier than usual. *Hay*—Owing to the fine weather in July the

hay crop, although lighter than last year, was secured in very good condition; about 30 cwt. per acre. *Meadow-hay*—Lighter than last year, and a lot of it badly got. *Potatoes*—From 5 to 8 tons according to variety; owing to dry weather some second growth; no disease to speak of. *Turnips*—About 17 tons, something similar to last year in weight; quality better; braided well; little resowing required. *Insects*—Practically no injury done by insects. *Weeds*—Not so many weeds as last year; better weather for cleaning the land. *Pastures*—Some of the pastures suffered pretty badly from drought during the summer, but there was an unusually abundant autumn growth. *Live Stock*—Stock did not thrive as well as might have been expected. Owing to the great fall in prices for cattle during the season it proved a disastrous year for graziers. Cattle and sheep free from disease. *Clip of wool*—Very good quality, and over the average weight.

STIRLINGSHIRE (Western District). *Wheat*—None grown. *Barley*—None grown. *Oats*—40 bushels grain as against 38 to 40 bushels in 1920; straw, 20 cwt., being 2 cwt. under 1920, due to lack of moisture in early part of season; grain and straw of good quality; seed, 5 to 6 bushels per acre. *Harvest* started two weeks earlier than usual, and was completed by 20th September. *Hay*—Ryegrass and clover 24 cwt. compared with 2 tons in 1920; clover not so plentiful as usual; reduced yield attributable to drought; secured in good condition. *Meadow-hay*—Average crop, and fairly well got. *Potatoes*—About 7 tons per acre, representing 1 ton above 1920; little disease; did not keep well in pits in some instances, owing, it is believed, to being raised too soon, following upon a second growth after rain came; no new varieties planted. *Turnips*—20 to 22 tons in comparison with 20 to 25 tons in 1920; quality good; braided slow, and in some cases a second sowing was necessary. *Insects*—No injury. *Weeds*—A certain amount of injury—but less than last year—from redshank. *Pastures* were not equal to 1920; first part of season too dry. *Live Stock* thrived fairly well. Cattle and sheep free from disease. *Clip of wool*—Average quality and quantity.

STIRLINGSHIRE (Eastern District). *Wheat*—About 40 bushels per acre; quality good; straw about 35 cwt.; seed, 4 bushels per acre. *Barley*—32 bushels per acre; quality good; 20 cwt. of straw; seed, 4 bushels per acre. *Oats*—About 32 bushels per acre; short crop; 18 cwt. of straw; 6 bushels seed sown per acre. *Harvest* was fairly early, but weather rather broken the first two weeks; afterwards crop was secured in fair order. *Hay*—Rather under the average, but secured in good order. *Meadow-hay*—Average crop. *Potatoes*—Average crop and yield. *Turnips*—Good crop—about 18 tons per acre. *Insects*—No injury. *Weeds*—Rather more charlock than usual. *Pastures*—Good. *Live Stock* thrived very well. Cattle and sheep free from disease. *Clip of wool*—Fair average clip.

CLACKMANNANSHIRE. *Wheat*—A fair average in grain, but short in straw owing to the long drought during the summer months. The grain ripened well, and owing to the good weather and early harvest the crop was secured in good condition. Yield from 35 to 40 bushels per acre; 3 to 4 bushels seed sown per acre. *Barley*—A good average in grain, of good quality; much better than last year, and was stacked in good condition; the colour of grain was very good. Average yield from 32 to 35 bushels per acre; 3½ to 4 bushels seed sown per acre. *Oats*—A fairly good average in grain, but very short in straw. The severe summer drought kept back the growth of straw very much in this district, which caused a deficiency of bulk in the stackyards, especially on

upper dryfield farms. Average yield 35 to 40 bushels per acre; 4 to 5 bushels seed sown per acre. *Harvest* began fully a fortnight earlier than last year, and earlier than it has been for several years. *Hay*—A fair crop in carse-land, and in dry fields much below the average. The hay harvest was excellent, and the crop was secured in good order. The yield varied so much that it is difficult to estimate. *Meadow-hay*—The crop was much below the average of last year, but having been secured in good condition, the quality was excellent. *Potatoes*—A fair crop all over, and better quality than last year; the drought caused a few blanks in the drills, but the bulk was not much affected; yield from $3\frac{1}{2}$ to 4 tons per acre. *Turnips*—This crop was barely an average; in some parts they were rather irregular with a good many blanks; the quality was good, and they kept well in the pits; the crop braided very well where early sown before the dry weather set in; there was little or no second sowing; yield from 8 to 11 tons per acre. *Insects*—Not much damage done by insects; less than usual. *Weeds*—The dry weather in summer helped to keep down weeds, except redshank, which was more troublesome than usual. *Pastures*—Towards the end of the summer months the grass was pretty much dried up, and looked brown and burned in some parts; after the autumn rains the pastures got quite green, and continued green, with a good bite for stock, well into the winter months. *Live Stock*—With the exception of the month of July, all kinds of stock did very well on the grass till late on. Cattle and sheep were free from disease. *Clip of wool*—Wool was a little over the average in quantity and quality.

PERTHSHIRE (Western District). *Wheat*—Straw and grain quite an average; grain, 36 bushels per acre; seed, $3\frac{1}{2}$ bushels per acre. The area under wheat was rather under the average; the crop was well harvested. *Barley*—The area under barley would be rather less than last year; yield of straw under an average; grain, 32 bushels per acre, of fair quality; seed, 4 bushels per acre. *Oats*—A full average area was sown; grain, 36 bushels per acre; seed, $4\frac{1}{2}$ bushels per acre; straw was deficient in bulk, but of good quality, and well secured. *Harvest* began about usual time. *Hay*—Yield of hay a full average, especially so in the case of Timothy hay, which is largely grown on carse land; the crop was well secured. *Meadow-hay*—Barely an average, and in many cases the crop was not well secured. *Potatoes*—A full average yield. Crop well secured and of good quality; the area under crop would be less than that of the previous years. There was not much disease; several new varieties were planted, but, generally speaking, the older and well-tried varieties hold the field. *Turnips*—The crop was over an average in bulk and quality; crop free from disease, and no second sowing. *Insects*—No injury. *Weeds*—Weeds were more visible than usual—couch, pearl-grass, and charlock being mostly in evidence. *Pastures* of average growth and quality with last year. *Live Stock*—Throve fairly well, but left nothing for grazing—in fact money was lost on all stock grazed during season. Cattle and sheep free from disease. *Clip of wool*—Wool of fair quality, but the clip would not be quite an average.

PERTH DISTRICT.

FIFESHIRE (Middle and Eastern District). *Wheat*—Yield from 35 to 40 bushels per acre, of exceptionally good quality, due to having been sown early and grown in favourable weather; the usual seeding is from $3\frac{1}{2}$ to 4 bushels per acre. *Barley*—Very irregular; on good deep land the crop was a fair average, but on dry hilly land in the north of Fife the

growth was checked by the excessive drought ; the yield may be stated as from 35 to 44 bushels per acre ; much of it was of secondary quality through adverse harvest conditions ; seeding from $3\frac{1}{2}$ to 4 bushels per acre. *Oats*—Not so prolific as last year, the straw being short and the colour darker ; the yield would be from 48 to 52 bushels per acre as a general average ; seeding from 4 to 6 bushels per acre according to variety. *Harvest* was earlier than last year, and although the weather was dull during the first week it improved afterwards. *Hay*—The hay crop was a full average, secured in excellent condition, with a yield similar to last year. *Meadow-hay*—The same applies to meadow-hay. *Potatoes*—Compared with last year the yield of potatoes would be much the same, averaging $6\frac{1}{2}$ tons per acre ; free from disease ; new varieties such as "Crusader" and "Nithsdale" gave a good yield of satisfactory quality. *Turnips*—The turnip crop was under the average, more especially on light soils ; the braird was checked by the exceptionally dry weather ; there was no second sowing of any consequence, but later on mildew was prevalent. *Insects*—The crops were unusually free from the ravages of insects. *Weeds*—The dry weather gave every opportunity to deal satisfactorily with weeds in the earlier part of the year, but later on some stiff fields were difficult to handle through weather conditions. *Pastures*—The pastures, where not burned, were of good growth and excellent quality, with an unusually good aftermath of clover. *Live Stock*—Stock of all kinds thrive well. There were cases of anthrax on the grass ; on one farm the whole stock of cattle had to be slaughtered. *Clip of wool*—The clip of wool was above the average and of excellent quality.

FIFESHIRE (Western District). *Wheat*—A good average crop ; yield 34 to 36 bushels per acre, but a shortage of straw due to the dry season ; usual seeding $3\frac{1}{2}$ to 4 bushels per acre. *Barley*—On many farms with dry land barley was a poor crop, being in many cases entirely burnt up ; average yield 24 to 32 bushels per acre, and the straw of poor quality and very short. The natural weights in some cases reported at 50 lb. to 52 lb. per bushel ; seeding 4 bushels per acre. *Oats* yielded a fair return, averaging 42 to 48 bushels per acre, all of good quality and average natural weight. Straw very light and easily consumed. Much of the oat crop died out, this being due to the continuous drought ; seeding about 6 bushels per acre. *Harvest* commenced about the 14th of August, and was general about the 20th, and was then held up for about ten days by rain ; it might be said to be a fortnight earlier than usual. *Hay*—Ryegrass hay a light crop, below an average, many yields not exceeding 25 cwt. per acre, but all of first-class quality. *Meadow-hay* also light in weight, and good in quality. *Potatoes* of late varieties, due to the autumn rains, were a large crop ; a fair average crop would be 7 tons of ware per acre ; there was, however, a large proportion of disease with the softer immune varieties ; the early crops gave light yields of good quality, average 5 tons per acre. *Turnips*—Early sown turnips an average crop of 22 tons and over, but many acres were long in brairding and never came to maturity ; turnips were consumed easily by sheep, causing great shortage in spring. *Insects*—All crops free from insect pests. *Weeds*—The lands were clear of weeds and crops were easily cleaned, due to the dry season. *Pastures* were good during the spring months ; June and July being very dry the pastures were completely burnt up, the stock in many cases having to be taken off. *Live Stock*—Generally speaking stock thrive well on pastures in spite of the dry grass. Cattle and sheep have been free from disease. *Clip of wool*—An average.

PERTSHIRE (Eastern District). *Wheat*—The best cereal crop of the year; yield about 32 bushels per acre; seed, 3 to 4 bushels per acre. *Barley*—Under average; yield about 36 bushels per acre; seed, 3 to 4 bushels per acre. *Oats*—Light crop; good quality; yield about 40 bushels per acre; seed, 4 to 6 bushels per acre. *Harvest*—About ten days earlier than usual. *Hay*—Fair crop of good quality; yield about 30 cwt. per acre. *Meadow-hay*—Very little grown. *Potatoes*—About 6 tons per acre, equal to about two-thirds of last year's crop; not much disease, but a considerable amount of second growth. *Turnips*—Promised to be a heavy crop until checked by "mildew"; weight about 20 tons per acre. *Insects*—Not more than usual. *Weeds*—About the usual damage. *Pastures*—Very bare up to 1st September, after which date there was an abundance of feed. *Live Stock* thrived very well. Cattle and sheep free from disease. *Clip of wool*—Good average; fine quality.

PERTSHIRE (Central District). *Wheat*—The Central District is not a wheat-growing area. A break was sown on a few of the farms. The wheat suffered less from drought, and while straw was somewhat short the yield of grain was a full average—about 36 bushels per acre. As a rule $3\frac{1}{2}$ bushels were sown to the acre. *Barley*—The crop on the whole was good, and the acreage sown was above the usual. The yield would be about 36 bushels per acre, weighing from 52 to 56 lb. to the bushel. *Oats*—The grain harvest started early in August, but was interrupted by the heavy rains during the month. A good deal of damage occurred on account of the delay in cutting. The grain on some farms sprouted and became discoloured, and the loss was considerable. The quality of the grain cut in September was good and it threshed out well. The straw was short on account of the drought. The yield would be about 35 bushels to the acre on an average. *Harvest*—Commenced generally early in August, which is before the usual time. *Hay* was of good quality and was secured in good order, but the yield was below the average. *Meadow-hay*—The yield was fairly satisfactory and on some farms better than last year. *Potatoes*—Progressed fairly satisfactorily throughout the season although growth was checked by the drought. Second growth was prevalent on some farms, and the yield in general was normal. The average would be from 8 to 10 tons per acre. There was a good deal of disease on some farms. *Turnips* were checked during the summer owing to the lack of rain; when the rain came the crop improved considerably. The yield on the whole was an average one. *Swedes* kept very well. Weight from 18 to 20 tons per acre. *Insects*—No damage to any extent in this district. *Weeds* were very plentiful, and difficult to keep down. This was accounted for by the dry summer and then the later rains. *Pastures*—Were rather bare in the early season but improved later. *Live Stock* generally have thrived throughout the year. Cattle and sheep free from disease. *Clip of wool*—A full average.

PERTSHIRE (Highland District). *Wheat*—None sown in the district. *Barley*—More area of land under barley; crops about an average, but straw short; ripened early; quality of grain good, but light in weight; 36 bushels. *Oats*—About an average crop, but straw short owing to the drought in June and July; moisture of August came too late; quality of straw and grain very good; 42 bushels per acre. *Harvest*—About three weeks earlier; general on the 1st September, and most of the grain very ripe. *Hay*—Crop throughout under average; 24 cwt.; quality good and very early got, but mixture of clover poor; aftermath poor. *Meadow-hay*—Much under an average, owing to the dry summer; August being wet, hay could not be made; quality bad.

Potatoes—Crop disappointing until August for earlies; after the rain made good progress; bulk under average; ware 6 tons; free from disease; quality good; not many new varieties planted. *Turnips*—Crop turned out over an average; 24 tons; quality good and no disease; a few fields got mildewed in September; braided well; no second sowing required. *Insects*—Little damage; much less than usual. *Weeds*—Much less damage from weeds than the average of years, owing to the dry spring and early summer. *Pastures*.—Very early grass, but pastures under the average in early summer; great growth in August and abundant grass of good quality to the end of autumn. *Live Stock*—Stock of all kinds did well both in summer and autumn. Cattle and sheep free from disease with the exception of isolated cases of sheep scab in one parish. *Clip of wool*—Quality of wool good and over an average clip.

FORFARSHIRE (Western District). *Wheat*—40 bushels of capital grain, with abundance of good straw; seed, 3 to 4 bushels. *Barley*—34 bushels; both grain and straw good quality but deficient in bulk; late fields disappointing, especially on light land; seed, 3 to 4 bushels. *Oats*—46 to 48 bushels of good quality; the dry season affected materially the bulk of straw, nevertheless it made excellent fodder; seed, 4 to 7 bushels, according to variety. *Harvest*, although early, was delayed owing to dull weather, with the result that a good deal of grain was lost on account of its being rather ripe. *Hay*—Lighter than average, say 34 cwt.; most of it, however, got in good order. *Meadow-hay*—Not grown to any extent, but a light crop. *Potatoes*—7 tons; a good average; no disease of account; the new variety "Crusader" appears to have done well. *Turnips*—16 to 18 tons; quality fair; mildew spoiled the appearance of some fields early in the season, but latterly the roots swelled out considerably and were nearly an average crop. *Insects*—Rooks cleaned some acres of turnips, and have of late been busy on some wheat fields; these are the "insects" which bother us most. *Weeds*—No trouble whatever with weeds. *Pastures*—Bare throughout the earlier part of the season, but good in late autumn. *Live stock*—Stock thrived well considering the bareness of the pasture. Cattle and sheep free from disease. *Clip of wool*—Average clip in lowlands; over average in hills.

ABERDEEN DISTRICT.

FORFARSHIRE (Eastern District). *Wheat*—A fine crop, both in grain and straw; grain 44 bushels, and straw 28 cwt. per acre; on all the lighter soils the grain got over-ripe before it could be cut, with the result on such lands that there was waste through shaking of 1 to 2 bags per acre; after cutting commenced a week was entirely lost through foggy weather, with this result; seed, 4 bushels per acre. *Barley*—The poorest of the grain crops this season, the summer drought badly burning up the crops on the lighter soils; yield, 34 bushels per acre of grain, and straw 14 cwt.; seed drilled, 3 bushels per acre. *Oats*—A fine crop in general, but similar damage through shaking as reported in the case of wheat; grain, 56 bushels per acre and straw 17 cwt.; seed, 4 bushels per acre of the old varieties, of which very few are now sown, and 6 bushels per acre of the newer thick-skinned varieties; the almost universal practice now is to sow these 3 bushels each way. *Harvest* commenced about the 15th August—earlier than usual—and finished in the third week of September; an excellent harvest, unless for one bad week which over-ripened the grain. *Hay crop*—Very variable; badly burned on light soils and a much heavier crop where the land was heavy and

moist; average yield, 1 ton 15 cwt. per acre; of very good quality, and mostly very well clovered. *Potatoes*—7 to 7½ tons per acre, about 2 tons less than last year; no disease, but a good deal of second growth, spoiling keeping quality; a fairly large acreage of the new immune varieties planted, but with one or two exceptions these are about played out, quality generally being very bad, and not to be compared with the older varieties. *Turnips*—Brairded very well, but drought and mildew in late summer and early autumn destroyed the crop greatly both for weight and quality; average yield under 20 tons, and the feeding quality nothing like up to the usual Forfarshire standard. *Insects*—No injury. *Weeds*—No damage, there being fewer “skellies” in this part of Forfarshire than for many years back. *Pastures*—Fair in summer, abundant in autumn: plentiful grass late in autumn, and fine weather, allowing stock to be kept in the fields much later than usual. *Live Stock*—All classes of stock thrive splendidly. Cattle and sheep free from disease, although cases of sheep scab on sheep coming to winter grazing from other counties are becoming far too prevalent. *Clip of wool*—A fair good clip of wool.

KINCARDINESHIRE. *Wheat*—The crop of the year; well harvested; 40 bushels per acre; seed, 3 to 4 bushels. *Barley*—Fair crop; 45 bushels per acre; seed, 5 bushels; well harvested. *Oats*—Fair crop, but much very short and burnt by drought; 40 bushels per acre. *Harvest* began about middle of August; finished very quickly. *Hay*—Fair crop; 30 cwt. per acre. *Meadow-hay*—Almost none in this county. *Potatoes*—Very much the same as last year. *Turnips*—Very varied; much injury from mildew. *Insects*—No injury. *Weeds*—Few weeds, owing to drought. *Pastures*—Very much burnt up. *Live Stock* thrive very well. Cattle and sheep free from disease. *Clip of wool*—Quite good clip.

ABERDEENSHIRE (Buchan District). *Wheat*—None grown. *Barley*—4½ quarters per acre; quality of grain and straw very good, being all secured in good condition; seed sown, 4 bushels per acre. *Oats*—5 quarters per acre; quality of grain and straw very good; all secured in good condition; straw was found to be rather dry when fed to stock; seed sown, about 6½ bushels per acre. *Harvest*—Very early, even in districts considered to be “late”; beginning made in August, and all finished by early September. *Hay*—Crop a little below average of last year; quantity about 2 tons per acre, of good quality. *Meadow-hay*—None grown. *Potatoes*—Crop excellent in quantity and quality; about 6½ tons per acre; no disease; potatoes not grown for sale, only for home consumption. *Turnips*—Crop 16 to 17 tons per acre; early sown turnips suffered much from mildew and proved of low feeding value to stock; swedes not so much affected; crop brairded well; no reosowing; turnip-tops went down very quickly with frost, thus exposing bulbs to effects of frost. *Insects*—No damage. *Weeds*—Damage much less than usual; the dry weather allowed farmers to keep weeds well down. *Pastures*—Not quite up to average growth, owing to the continued dry weather; the quality was good. *Live Stock* thrive well; stock always thrive in warm dry weather, even if pasture is a little bare. Cattle and sheep free from disease. *Clip of wool*—About the average.

ABERDEENSHIRE (Central District). *Wheat*—None grown. *Barley*—30 bushels per acre—1 bushel less than last year; straw, 17 cwt. per acre—1 cwt. less than last year; quality of both grain and straw better than last year. Natural weight of grain per bushel, 56 lb.; seed used, 3 to 3½ bushels per acre where drill-sowing machine used; where broadcast or hand-sown, 4 bushels per acre. *Oats*—35 bushels per acre—

2 bushels less than last year; straw, $13\frac{1}{2}$ cwt. per acre— $2\frac{1}{2}$ cwt. less than last year; quality of both grain and straw better than last year. Natural bushel-weight of grain, $43\frac{1}{2}$ lb. per bushel on an average, but ranging from 40 lb. to 46 lb.; seed used: potato and all thin-husked varieties, $4\frac{1}{2}$ to 5 bushels per acre where drill machine used; 6 to $6\frac{1}{2}$ bushels where broadcast machine used or sown by hand; all thick-husked varieties, 2 to $2\frac{1}{2}$ bushels per acre extra. *Harvest*—Bere and barley harvest about a fortnight earlier than last year, and commenced from the middle of August to end of the month; oat harvest began about the third week of August. All harvesting work was completed in record time, and all crops secured in fine condition. *Hay*—18 cwt. per acre—6 cwt. less than last year; quality even better than last year's, which was good. Much the same as last year's as regards the mixture of ryegrass and clover. *Meadow-hay*—12 cwt. per acre—4 cwt. less than last year; quality much the same as last year. *Potatoes*—About 6 tons per acre—same as last year. No disease reported; quality much the same as last year. No new varieties reported; "Arran Comrade," "Arran Chief," "Iron Duke," "Kerr's Pink," "Dalhousie," "Main Crop," "Sutton's Abundance," were all planted as general field crop, "Ashleaf," and "Duke of York," being favourites for early garden and plots. *Turnips*—12 tons per acre— $3\frac{1}{2}$ tons less than last year. Braird was slow in coming—season too dry; very little second sowing required, and where in some cases second sowing was resorted to it was found that the seed was lying dormant in the soil. *Insects*—No report of crops being injured by insects. Rooks, however, did a great deal of damage to young turnip plants by pulling, and mildew was very prevalent, more especially on thin dry land. *Weeds*—No report of injury to crops by weeds. *Pastures* on the whole were an average and of fine quality. *Live Stock*—Stock did well on pastures. Cattle and sheep free from disease. *Clip of wool*—Much about the same as last year, if any difference slightly heavier; quality much about the same.

ABERDEENSHIRE (Strathbogie District). *Barley*—As a rule Strathbogie does not produce much barley, and the tendency is rather towards a decrease in the acreage. The season being early, the crop matured in good time and as a rule was well secured. The results of threshing have been satisfactory. In some instances the returns have reached 40 bushels per acre, weighing from 54 to 56 lb. per bushel, when grown on land in good heart, or where a liberal dressing of artificial manures had been applied. *Oats*, where grown on land in good heart, were generally a fairly good crop but rather deficient in straw, with the result that fodder on many farms was somewhat scarce and had to be carefully handled during the season. The grain was good—above the average in quality,—and the return per acre on good land may be estimated at about 40 bushels per acre. Grain manures being expensive last season, few farmers gave a dressing to the oat crop. The grain weighs from 41 to 43 lb. per bushel. This being a somewhat late district, the newer varieties of oats do not, as a rule, find much favour, as they are apt to produce grain with a thick skin, which is not favoured by millers. *The harvest* was earlier than usual, and all the crops were secured in good condition. *Hay* was a lighter crop than is usually produced in the district. The early part of the season for making was ideal, and those farmers who were able to take advantage of the weather got the crop, which was easily handled, and secured in good condition. *Meadow-hay*—None grown. *Potatoes* were generally a heavy crop for the district, and the quality was of the best. The newer varieties, such as "Kerr's Pink" and "Arran Comrade," have done well, and will doubtless come

into favour, as both are good croppers and in the list of immunes, which is of importance. *Turnips*—A good crop was grown, of excellent quality where the land was in good heart. Probably in such soil the weight might range round 20 tons per acre. On light land, of which there is a considerable acreage in the district, the yield may be stated about 12 to 14 tons per acre. There was no resowing, or damage caused by insects. The plants came forward early where the seed was sown before the land got dried up when being worked. The latest sowings were stiff to come to the hoe and did not do so well. *Pastures* were generally productive, but on the dry side for stock. On many farms water was particularly scarce, some wells having given in which were never known to be dry before by the proverbial "oldest inhabitant." The *clip of wool* was good, but prices far from remunerative to growers.

BANFFSHIRE (Lower District). *Wheat*—Practically none grown. *Barley*—About 40 bushels per acre; grain of excellent quality on early farms where carefully harvested; seed sown, 4 bushels per acre on light land and 5 bushels per acre on heavy land. *Oats*—About 45 bushels per acre and 22 cwt. of straw; quality of grain good where well harvested; average crop. *Harvest*—Barley harvest began on the early farms on 4th August; oats began on 14th August; all harvesting operations completed by the 20th September. *Hay*—30 cwt. per acre, an average about same as previous year; quality excellent. *Meadow-hay*—Practically the same as last year—22 cwt. per acre; quality good. *Potatoes*—Yield about 10 tons per acre—same as that of last year; quality good; no disease. The new varieties grown were "Crusader" and "Roderick Dhu." These gave large yields; quality all that could be desired; no disease of any kind. *Turnips*—Quantity 30 tons per acre, as against 25 previous year; quality excellent; no disease, and kept well during the winter; crop braided well; no second sowing. *Insects*—No injury. *Weeds*—No trouble from weeds, as the weather was very suitable for cleaning the ground. *Pastures*—Below average, and 10 per cent less than last year. *Live Stock* did well during the whole of the grazing season. Cattle and sheep free from disease. *Clip of wool*—Quality good; above average.

BANFFSHIRE (Upper District). *Wheat*—None grown. *Barley*—About usual area sown; a good average return, up to 5 quarters per acre, of heavy weight; seed sown, from 4 bushels per acre. *Oats*—Generally a full crop on good heavy soils, up to 6 quarters per acre; thin and moorish ground suffered from lack of moisture, and straw thereon was short, and return of grain less by 1 or 2 quarters per acre. *Harvest*—Began on an early date for this district; a beginning was made at 20th August; work was in full swing all over on the first weeks of September, and crop was secured throughout in capital order. *Hay* crop under an average, owing to lack of moisture in early stages; many fields were rich in clovers and would weigh from 30 cwt. to 2 tons an acre. *Meadow-hay*—Of no account over the district. *Potatoes* are only grown for home consumption; they were altogether of good quality, and no disease. *Turnips*—Generally a fair average crop; weights are not easily obtainable; the crop braided very well, and no second sowing. *Insects*—No damage. *Weeds*—Wild mustard (skellock) was very prominent; spraying is never resorted to hereabouts. *Pastures* were remarkably good considering the abnormally dry season, white clover being particularly abundant. *Live Stock*—The stock thrived well and store beasts grazed profitably on to a later date than usual. No disease to speak of among cattle and sheep. *Clip of wool*—Wool of usual quantity; prices again low.

INVERNESS DISTRICT.

MORAYSHIRE. *Wheat*—Very little grown ; being winter-sown, did not suffer from the drought as did the spring-sown grain crops ; where seed was not treated smut was in evidence, otherwise quality excellent ; about 40 bushels per acre and 35 cwt. straw. *Barley*—About 32 bushels per acre, or 5 bushels less than last year ; straw about 18 cwt., or half last year's crop ; weight of grain about standard ; colour excellent ; seed sown, 3 to 4 bushels. *Oats*—About 30 bushels, or 10 bushels less than last year ; quality excellent ; weight per bushel about 44 lb., or 2 lb. over standard ; quality of straw good, quantity much less than usual—not over 20 cwt. ; seed sown, 5 to 8 bushels, according to variety. *Harvest*—Earlier than usual, first week in August ; with poor crops, the harvest was only too easily undertaken, and all was got in in excellent order. *Hay*—About 20 cwt. per acre, or 4 cwt. less than last year ; well mixed ; secured in first-class order. *Meadow-hay*—Little grown ; less than usual this year. *Potatoes*—About 5 tons per acre, or 1 ton less than last year ; no appreciable disease. *Turnips*—About 18 tons, or 4 tons less than last year ; quality excellent, and although the crop was smaller they seemed to last well ; the drought broke for a little about the time of sowing, so they got a good start, with little second sowing. *Insects*—No noticeable damage. *Weeds*—No noticeable damage. *Pastures* suffered severely from the drought, and this was reflected in the condition of the stock. There was no disease among cattle and sheep, but the fall in the market price was serious. *Clip of wool*—Average, both as to quantity and quality.

NAIRNSHIRE. *Wheat*—Only grown on two farms. *Barley*—32 bushels per acre ; straw short, but grain of good quality ; 4 bushels sown. *Oats*—30 to 32 bushels, grain good, but straw extremely short ; 5 to 7 bushels sown. *Harvest*—Early in August, a week or ten days earlier than usual. *Hay*—A light crop, much the same as last year. *Meadow-hay*—None cut in this county. *Potatoes*—A short crop ; 3 to 4 tons per acre ; no disease. *Turnips*—A fairly good crop, 18 tons per acre ; crop braided well and was very promising for a time, but lack of moisture affected it adversely ; no second sowing was required. *Insects*—No injury. *Weeds*—No injury. *Pastures*—Better than last year. *Live Stock* thrived fairly well. Cattle and sheep free from disease. *Clip of wool*—An average clip.

INVERNESS-SHIRE (Inverness District). *Wheat*—About 42 bushels per acre, much the same as last year ; quality good ; weight per bushel about 60 lb. ; straw about 30 cwt. per acre ; seed sown, 4 to 4½ bushels per acre. *Barley*—About 38 bushels per acre ; weight per bushel about 55 lb. ; straw about 26 cwt. per acre ; quality good ; seed sown, 4 bushels per acre. *Oats*—About 40 bushels per acre ; weight per bushel, say about 42 lb. ; straw 26 to 28 cwt. per acre ; seed sown, 4 to 8 bushels per acre, according to variety and altitude. *Harvest*—Earlier than usual ; began about middle of August. *Hay*—Quite up to an average ; quality good, and well secured ; about 25 cwt. per acre. *Meadow-hay*—Very little grown. *Potatoes*—Fine quality ; no disease ; very well harvested ; 7 to 8 tons per acre. *Turnips*—Weight fully more than last year ; about 22 tons per acre ; quality suffered somewhat from mildew, and keeping quality deteriorated. *Insects*—No injury. *Weeds*—Much about usual. *Pastures*—Fully up to an average ; latterly affected by drought. *Live Stock*—Quite up to an average season. Cattle and sheep free from disease. *Clip of wool*—Good ; quite up to average.

INVERNESS-SHIRE (Skye). *Wheat*—None grown. *Barley*—None grown. *Oats*—The quality of the crop was under the average owing to the very cold and wet summer, and it was harvested in bad condition on account of the exceedingly wet autumn; the bulk of straw was about average. *Harvest* began about 12th September. *Hay*—Rye-grass a light crop; clover almost a failure. *Meadow-hay* a good crop, but could not be well secured on account of continuous rains. *Potatoes* quite a failure owing chiefly to strong winds and cold weather in August and September; the crop looked promising during summer. *Turnips* a somewhat light crop; braided well and no second sowing was required. *Insects*—No injury. *Weeds* not more injurious than usual. *Pastures*—Grass came out very early; suffered a severe check in latter part of April and first part of May; from June onwards an average growth. *Live Stock* thrived well; sheep had a good start, coming through the spring in strong condition. Cattle and sheep free from disease. *Clip of wool*—An average clip.

INVERNESS-SHIRE (Lochaber). *Wheat*—None grown. *Barley*—None grown. *Oats*—Grain same average as last year; straw much lighter crop; 6 bushels per acre sown. *Harvest* 10 days earlier than last year. *Hay*—Clover 10 cwt. per acre lighter than previous year. *Meadow-hay*—Fair crop. *Potatoes*—Same as last year; no disease, and no new kinds planted. *Turnips*—Crop 10 cwt. better than last year; good braided; no second sowing. *Insects*—No injury. *Weeds* not so numerous; Carron weed still prevalent. *Pastures*—Under the average owing to drought. *Live Stock* thrived very well considering shortage. Cattle and sheep free from disease. *Clip of wool*—Quality good and clip heavier.

ROSS-SHIRE (Dingwall and Munlochy). *Wheat*—Not many acres grown; quality of grain and straw good; yield 4 to 5 quarters per acre; seed sown 3 to 4 bushels per acre. *Barley*—Quality of grain and straw good; yield 30 to 44 bushels per acre; seed sown $3\frac{1}{2}$ to 4 bushels per acre; straw not so short as last year. *Oats*—Quality of grain and straw very good; yield 48 to 72 bushels per acre; seed sown from $3\frac{1}{2}$ to 6 bushels per acre according to variety; straw much longer than last year but still affected by the dry weather. *Harvest* began about the usual time, but some early varieties of oats were earlier ripe than usual. *Hay*—Quality good; quantity short owing to dry season; yield about $1\frac{1}{2}$ tons per acre. *Meadow-hay*—None grown. *Potatoes*—Yield about 5 to 7 tons per acre; practically no disease; quality of potatoes good; no new varieties planted. *Turnips*—Weight of swedes 20 to 28 tons per acre; yellows 15 to 27 tons per acre; crop of turnips very good and sound; crop braided, on the whole, well, but light land was affected by the dry weather; almost no second sowing except where crops pulled out the young plants. *Insects*—No injury. *Weeds*—No damage done. *Pastures* were average growth; the dry summer told, but after the rain came grass was very abundant. *Live Stock* thrived very well. Cattle and sheep free from disease. *Clip of wool*—Average; quality good.

ROSS-SHIRE (Tain, Cromarty, and Invergordon). *Wheat*—Average about 40 bushels per acre, being 4 bushels better than last year; quality good; straw, both quantity and quality good; average sown, 4 bushels per acre. *Barley*—Average about 40 bushels per acre, being about 4 bushels better than last season; quality good; straw, both quantity and quality good, above average; average barley sown, $3\frac{1}{2}$ bushels per acre. *Oats*—Average about 60 bushels per acre, quality very good; straw, quantity and quality above average; quantity sown, 4 to 6 bushels per acre. *Harvest*—Began about 28th August, about ten days earlier than usual time. *Hay*—Average crop, about 30 cwt. per acre,

about same as previous year; quality very good. *Meadow-hay*—None. *Potatoes*—Yield of potatoes about $6\frac{1}{2}$ tons per acre, about 2 tons less than previous year; no disease. Owing to experience of year before, when there was no demand for seed or ware of new immune varieties, a number of these were discarded in favour of old tried non-immune varieties. Of new varieties, "Crusader" was planted and cropped well, of good quality. *Turnips*—Swedes would average about 25 tons per acre and yellows about 18 tons per acre, about 5 tons less per acre than previous year, which was considerably above average. *Insects*.—No injury. *Weeds*—Some grain crops injured with charlock; otherwise weeds were not worse than usual. *Pastures*—Owing to dry weather pastures went off early and got very bare; quality was good. *Live Stock* thrived all right. Cattle and sheep free from disease. Some horses died of grass-sickness. *Clip of wool*—About average as regards quantity and quality.

SUTHERLANDSHIRE. *Wheat*—No wheat grown. *Barley*—Fair crop; threshed fairly well; average about 4 quarters per acre; seed sown from 4 to $4\frac{1}{2}$ bushels per acre. *Oats*—Light generally on account of dry season, but slightly more straw than in 1920; new varieties of thick-skinned oats coming into favour and displacing Potato and Hamilton, because of a larger yield per acre; "Victory" is the favourite new variety, and even in these parts gives up to 6 quarters per acre. *Harvest* commenced about the last days of August—similar to the past two years; very favourable harvest, everything being cut and secured within 5 weeks; this applies to the eastern side of the county, but although the dates are later the same thing holds generally throughout the county. *Hay* a light crop on account of dry weather; clover exceptionally good, more especially in pastures; the average crop would be from 1 to $1\frac{1}{2}$ tons per acre. *Meadow-hay*—No meadow-hay in this part of the county. *Potatoes*—Crop very good—above the average; from 6 to 7 tons per acre; no disease; new varieties growing in favour; "Arran Chief" prime favourite; old kinds such as "Champions" are being gradually displaced. *Turnips*—Crop fair to very good; similar to last year but better in some instances; best from 20 to 30 tons per acre, but average much below that; braided well; no second sowing worth mentioning. *Insects*—Turnip plants injured principally by pigeons and in a lesser degree by "fly"; mildew did a good deal of damage later in the season. *Weeds*—Crops injured only to a small extent; similar to last year; dry weather very favourable for clearing ground. *Pastures*—A splendid growth of clover and plenty feed in most cases, but some fields gave very poor results. *Live Stock* thrived unusually well; this is common in dry hot seasons. Cattle and sheep quite free from disease. *Clip of Wool*—An average clip, generally of good quality.

CAITHNESS-SHIRE. *Wheat*—Not grown to any extent. *Barley*—A fair average crop of about 35 bushels; seed from 4 bushels per acre; secured in good condition. *Oats* had a very good downlay, as the ground had been worked in mealy dry condition throughout the season; 4 to 7 bushels are sown broadcast according to variety; large seeds need thicker sowing; there was fully an average yield of 4 to 10 quarters per acre. *Harvest* was a fortnight earlier than usual, beginning the first week of September, and the weather proved favourable for the cutting and the taking in. The grain was secured without drenching rains, and there were few or no instances of heating in the stack. Nets are now used instead of "simmons" for securing the screws, which thus stand a hurricane better, and hold the thatch more securely than with the straw ropes. *Hay*—Ryegrass and clover grew well, but rather thin in some places owing to the dry summer; it was secured in good order, and there would be a crop of $1\frac{1}{2}$ to 2 tons per acre. Kidney vetch is being used

with good results. *Meadow-hay* crop was a full average in most places. *Potatoes*—A good potato year, and there would be a yield of 7 to 12 tons per acre of good mealy tubers. Disease was not rampant, but the champion variety became most affected. "Beauty of Hebron" is in favour as an early potato; "Abundance" gives a heavier yield of larger size, and suited for later use, and is now superseding the "Champion" from its former place as the chief potato. *Turnips*—A heavier weight of turnips and of larger size than most years. The seed germinated readily, and came early fit for singling, and kept growing on; about 20 tons per acre might be an average, but in many instances there is a third more of sound juicy turnips; there are also cases where the roots are very small. *Insects*—The ravages of grub were not serious. *Weeds*—Thistles are most troublesome, but coltsfoot is spreading and difficult to check; spurry, corn marigold, and sow thistle affect certain localities, and skellock (wild mustard) is also prevalent throughout the county. *Pastures*—The pastures kept in a healthy condition compared with former years. *Live Stock*—The stock came well on, but prices are coming tottering down. Cattle and sheep that were bought in will not give any surplus for their keep; in many cases they were a dead loss. Tuberculosis continues among cattle and sheep; scab, which was almost exterminated in the county, has had a serious outbreak, traceable to a neighbouring county; extra dipping is felt to be a grievance. *Clip of wool* was up to average, but its value has come lower than the labour and expense of securing it.

ORKNEY. *Wheat*—None grown. *Barley*—Bere yield about 36 bushels per acre, weighing about 49 lbs. per bushel. *Oats* were sown in April, and there were fine showers all summer and a good crop of both straw and grain; yield about 36 bushels per acre, weighing about 40 lbs. per bushel; both bere and oats were about 4 bushels more per acre than the previous year. *Harvest* began about 20th September, being a little later than the previous year, and was finished about 12th November. *Hay* was secured in good condition and weighed about 25 cwt. per acre. *Potatoes* were a good crop, weighing about 5 tons per acre. *Turnips* were a good crop, weighing about 13 tons per acre. *Insects*—Some oats were damaged by grub. *Weeds*—Not much damage. *Pastures* were good and full of clover. *Live Stock* thrived fairly well and were free from disease. *Clip of wool*—About an average.

SHETLAND. *Wheat*—None grown. *Bere*—Good average crop of straw, but grain below last year both in weight and quantity per acre. *Oats*—Very good yield of straw; grain much below the average of previous year owing to want of sunshine to fill it. *Harvest* was about a week later than last year, and a long spell of wet weather kept the crops standing out until well on in November. *Hay* crop turned out very good and much heavier than last year; quality was good, and it was secured in good condition. *Meadow-hay* was also a very good crop and was secured in good condition. *Potatoes*—The potato crop was very poor both in quantity and quality; the frosts in June completely ruined the crop in some parts, so that any new varieties had no chance of a fair trial. *Turnips*—The turnip crop was very good; weight per acre heavier than last year; quality good; only one sowing was required. *Insects*—No damage was done by insects. *Weeds* were not troublesome, except charlock, which is plentiful every year. *Pastures* were of average growth, but the quality of the grass was not so good as last year owing to lack of sunshine. *Live Stock* did not come off the pasture in autumn in such good condition as last year, but improved later in the season. No disease either amongst cattle or sheep. *Clip of wool*—The quality of wool was very good; about the average of former years.

THE WEATHER OF SCOTLAND IN 1921.

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THIS report consists of (1) a general description of the weather over the Scottish area from month to month; (2) a selection of rainfall returns in which each county in Scotland is represented by one or more stations. It is to be noted that all the temperature readings referred to are, unless otherwise stated, from thermometers exposed in the regulation "Stevenson Screen."

JANUARY.

The abnormally mild weather which had set in just before Christmas 1921 had proved the forerunner of a year that was characterised by many considerable periods during which temperature was much above the average. During January the only really cold weather occurred between 11th and 16th, and in a brief snap on 24th, and during the first ten days and the last week very mild conditions prevailed. The month, however, was much less mild than the January of 1916 or 1898. The extremes were 57° at St Andrews and Kettins on 20th, and 11° at Braemar on 15th.

There was an exceptional area towards the north-east with a rainfall below the normal, and in north-east and east there were many fine days. But over the greater part of Scotland and also in England and Wales the month was an extremely wet one. Mid-Lothian, Berwickshire, and parts of Argyllshire and Dumfriesshire had fully twice the normal; at Glencarron (17·60 in.) the month was the wettest January for at least thirty-five years; at Poltalloch the wettest for at least fifty-five years; and at Rothesay the wettest since 1872. Here and there, however, in the regions of greatest excess amounts were less than those recorded in 1916 or 1903. The wettest periods were from 1st to 10th (3·41 in. at Ardgour on 5th), and from 21st onwards (as much as 4·20 in. at Invergarry on that day).

The weather was very stormy for several days around 5th, around 20th, and towards the end of the month. There was snow in many districts between 11th and 18th, and along the east coast on 24th with as much as 8 in. at Dundee. Thunderstorms occurred in the west on 17th or 18th.

The month was, on the whole, cloudy, though rather sunny towards the north-east.

FEBRUARY.

During January pressure conditions had been very irregular, but during February the barometer stood, as a rule, at a very high level, and the mean pressure for the month was higher than in any month since May 1896. Some fairly cold weather occurred during the first two weeks (14° at Braemar on night of 7th–8th); but thereafter conditions were mild or very mild (59° at Arbroath on 16th). The month, as a whole, was only less mild than the February of 1914 or 1918.

The generally stable pressure conditions were reflected in an abnormally low rainfall in all parts of the British Isles. In the west of Scotland the month was hardly so dry as the February of 1919 or 1917, but in the east generally it was the driest February since 1891, and at Gordon Castle the driest since 1878. Many places had less than half an inch for the entire month, mostly accounted for on one or two days, and wide areas less than one-quarter of the normal rainfall.

But little snow was experienced; no thunder was reported; and wind force was, as a rule, moderate, though high on 4th and around 15th.

In most districts the month was rather cloudy, though at Edinburgh it was somewhat sunnier than usual. There was a fairly widespread visitation of fog around 10th.

MARCH.

A sudden incursion of wintry weather on 5th lasted only three or four days—the night of 6th–7th was nearly everywhere the coldest of the year (5° at Braemar)—but thereafter there was a three weeks' spell of mild conditions. A slight reaction from the very high readings on 24th (64° at Banff) was followed by a decided recovery in eastern districts at the end of the month.

Thus during the last few days of 1920 and the first three months of 1921 there were in Scotland only brief visitations of cold, and this indeed was the character of the period over Western Europe generally.

A very dry February was followed in Scotland by a very wet March, though there were exceptional areas towards north-east and south-east with a deficient rainfall. In north-western districts the excess was very large, and various places—*e.g.*, Greenock and Glasgow—had amounts that have been exceeded in March during the last forty or fifty years only in 1903. In the east there were many dry days—elsewhere but few. The heaviest falls occurred from 1st to 4th,

on 8th and 9th, from 12th to 16th, and during the last ten days (3·40 in. at Achnacarry on 23rd, as compared with less than 2 in. at Aberdeen for the whole month).

The weather was stormy around 4th, with a widespread fall of snow on morning of 5th, in most districts quickly giving place to rain, but continuing very heavily in Aberdeenshire on 6th. On 15th and 16th severe gales were general, with great structural damage in the Hebrides. Towards the end of the month there was again a little snow.

Thunder occurred at one or two places in the far north on 4th or 19th. Hail was frequent.

The month was fairly sunny in the east, but distinctly cloudy in the west.

APRIL.

The barometer, as in February, stood for the most part at a very high level, and a higher mean pressure for April has been recorded only once in Scotland during the last fifty years—in 1893. From about 13th to 19th there was a spell of decidedly wintry weather; but otherwise the month continued the general record of the year as a mild one, with a mean temperature at most places the highest recorded in April since 1914. The extremes were 73° at Fort William on 30th, and 18° at Braemar, Eskdalemuir, and West Linton on 16th.

The month was a dry one in all parts of our islands, and the greater part of Scotland had less than half the normal rainfall. There was rain here and there around 3rd and somewhat generally around 22nd; but the periods from 6th to 11th and from 24th onwards were rainless or nearly so. At Edinburgh more than half of the month's small total was due to a fall of snow on night of 17th–18th, and nearly everywhere the greater part of the whole precipitation was accounted for between 12th and 18th.

The severest snowstorm of the year occurred in the middle of the month, setting in towards the north and on the Borders on 14th, and continuing in some districts on 15th. A recurrence on night of 17th–18th was confined chiefly to eastern districts, and the snow quickly disappeared. During this wintry period hail was frequent and wind force high.

Thunder occurred in the south of Scotland on 13th and 17th.

The month was a very sunny one, especially towards the end.

MAY.

From 2nd to 5th there was a late, but brief, visitation of quite wintry weather (22° at West Linton and Eskdalemuir on night of 4th–5th). Thereafter conditions for the next three

weeks were mild, and around 25th quite warm (75° at Gordon Castle), with colder weather during the last few days of the month.

Relatively to the normal, rainfall varied greatly. Thus there was a deficiency in most eastern coastal districts, but towards north-west a well-defined excess. From about 7th to 26th some districts were practically rainless; but at the beginning of the month there were moderate amounts, and from 27th onwards rain was general, with some fairly heavy falls on 28th, and again on 30th. On the latter day Rothesay had 1.32 in., or as much as the rainfall at Aberdeen for the entire month.

Snow, sleet, and hail were general on 3rd and 4th.

Thunder occurred here and there on 8th, and somewhat widely from 27th to 31st.

At Aberdeen the month was the sunniest May since 1882.

JUNE.

As in February and April, the barometer stood almost continuously at a high level, and in Scotland in June a higher mean pressure has been recorded during the last fifty years only in 1887.

There were very considerable alternations of temperature. Around the middle of the month there was a brief warm spell, with cool or cold weather on either side of it. Another brief spell of great warmth, lasting only three or four days, culminating on 25th (88° at Wolfelee—the highest temperature recorded in Scotland since June 1914), was followed by an acute reaction (29° at West Linton on night of 26th–27th).

Except in the extreme north the month ranks as a very dry one. Wide areas had hardly more than nominal aggregates—*e.g.*, only 0.25 in. at Kirkcaldy—and many districts less than one-quarter of the normal. Apart from general but slight falls around 8th and 21st, a great part of Scotland was practically rainless. Conditions recalled the June of 1887, which, however, was a very warm month; but here and there June 1918 was even drier. It may be noted that in England, and especially towards the south-east, there was a drought of unequalled intensity, with absolutely no rain in parts of Sussex.

A severe gale was general on night of 9th–10th, and on evening of 20th a few flakes of snow fell at Aberdeen.

There was thunder at West Linton on 10th.

The month was a decidedly sunny one, except in the far north.

JULY.

The month was notable for a prolonged spell of warm weather, lasting from 3rd to 27th, with quite unusual outbursts of heat on 10th and 18th. On 28th there was an abrupt change to cool conditions (32° at Braemar and West Linton on night of 29th–30th); but, on the whole, the month stands out as almost the warmest July on record, equalled in 1911, and surpassed only in 1901. The highest reading was 86° at Perth on 18th, which compares with 90° at that place on 12th July 1911; whilst at Aberdeen the 10th, with 86° , was the warmest day in that city since July 1876.

There were moderate rains in many districts around 6th and 15th; but in others the dry weather of June persisted until 18th or 19th of July. On 21st the drought was effectively broken, and a rainy period commenced, which lasted, with but slight breaks, until the beginning of September. On 21st, 22nd, 28th, and 30th there were heavy falls in south-west and south—at Cargen 2.27 in. on 21st, or considerably more than fell in many eastern districts during the entire month. Aggregates were more or less deficient in the east, but decidedly above the normal in west and south.

The June-July dry period was possibly most conspicuous in the Edinburgh district, where the total rainfall from 31st May to 14th July was only 0.37 in. In the south-east of England July was almost as dry as June.

There was thunder here and there from 14th to 18th.

Towards the north the month was rather cloudy; elsewhere sunshine records did not differ greatly from the normal.

AUGUST.

The month was the first of the year with a mean temperature below the normal in Scotland. Towards the end there was ground frost in various districts, and the only warm weather experienced was during the first day or two, and from 18th to 20th (79° at Ruthwell on 20th). On the night of 30th–31st the thermometer in screen at Eskdalemuir fell to 32° . In Ireland also the month was mostly cold, but warm in England and Wales.

Rainfall was below the normal in north-east and north-west, but elsewhere in excess, and in many districts unsettled conditions were almost continuous. The wettest period was from 16th to 20th, with as much as 1.70 in. at Grantown-on-Spey on 20th, an amount greater than the entire rainfall at that place during each of the months February, March, April, June, September, or November. Rather heavy falls were also general on 1st, 9th, and 26th.

The wet weather from 16th to 20th was associated with incipient or fully-developed thunderstorms, and there was sporadic thunder at the beginning of the month, and in south Ayrshire on 29th.

There was much fog and mist during the third week, and the month altogether was very cloudy.

SEPTEMBER.

The month was in all parts of our islands very warm for early autumn, and in many districts of Scotland it was the warmest September since 1901, though closely approached in 1906 and 1917. Temperature rose steadily until 8th or 9th (81° at West Linton on 9th), when rather cold weather followed for a week or two, with a marked recovery until almost the end of the month. An outstanding feature was the general mildness of the nights. The lowest reading recorded was 30° (at Balmoral on night of 11th-12th), and in nearly every other September in Scotland, at least during the last sixty years, the thermometer has fallen to some lower level than that.

After rain nearly everywhere on 1st there was a fine spell of about a week. From 9th to 13th or 14th wet weather was general, with some heavy falls in west and south; whilst the latter half of the month was rainless, or nearly so, over a great part of Scotland. Except in the far north the month ranks as a dry or very dry one, with the deficiency most marked in north-east and south-east; and at Aberdeen a drier September has occurred during the last fifty years only in 1894.

There was thunder here and there on 1st and 10th.

In northern districts the month was very cloudy, but in southern decidedly sunny on the whole.

OCTOBER.

With an excess of south-westerly winds, the month was one of quite exceptional mildness, and during the last sixty years in Scotland a milder October has occurred only in 1908. From 22nd to 24th northerly winds brought a brief spell of cold weather (22° at West Linton on night of 23rd-24th); but except at that time temperature was high to very high for the time of year. The first ten days were exceptionally mild (76° at Dumfries on 9th).

Relatively to the normal rainfall varied greatly. Towards north-east and south-east aggregates were below the normal, whilst along the Forth-Clyde belt and towards the north-

west there was a decided excess. Wet weather was general early in the month, around 13th, from 20th to 22nd, and on 31st, with heavy rain towards north-west on 17th (2·22 in. at Glencarron). In some districts no rain fell from 23rd to 30th. At Aberdeen the month was the driest October since 1904.

On 5th the weather was very stormy, and serious flooding occurred in the Lochaber district, and from 28th onwards gales were more or less general. From 20th to 22nd there was much snow in hilly districts, with heavy rain and flooding in the south.

Thunderstorms were experienced rather widely on 5th and 6th.

In southern districts the month was, on the whole, rather sunny, but towards the north it was exceptionally cloudy.

NOVEMBER.

With frequent winds from some easterly point there were visitations of rather wintry weather for a few days from 2nd or 3rd onwards, and again around 27th; but greater cold was experienced in England than in Scotland. Temperature was high on 23rd and 24th (64° at Glencarron), and again at the very end of the month. The lowest reading reported (10° at Logie Coldstone on 27th) was not remarkable for November.

In all districts precipitation was below the normal; towards north-west there was a considerable area with much less than half the normal; and at some points in the West Highlands the month was the driest November on record. Amounts were largely accounted for early in the month, and between 13th and 22nd.

Over wide areas no snow fell; but during rather stormy weather there was snow in some districts on 3rd, quickly giving place to rain, with a rather severe snowstorm towards the north-east from 6th to 8th.

Cloudy periods alternated with very sunny ones, and there was a good deal of fog, especially towards the end of the month.

DECEMBER.

There were touches of wintry weather around 21st, and again on 28th and 29th; but in general a very mild south-westerly type of conditions prevailed, and on the whole the month was the mildest December since 1900. At Aberdeen the 8th, with 58°, was the warmest day experienced in December in that city for fifty years. The lowest temperature

reported (22° at Braemar on 4th) was unusually high for a winter month.

As is generally the case with a mild south-westerly type of weather in winter, there was a great contrast between eastern and western districts as regards rainfall. Towards north-east and south-east the month was decidedly dry, with totals largely accounted for between 18th and 21st and between 26th and 30th. In western districts, on the other hand, wet weather was practically continuous after 3rd, with some very heavy falls, more particularly from 4th to 8th and towards the end of the month. In parts of the West Highlands a wetter December has occurred only once or twice; at Kinlochquoich more than 4 in. fell on 4th and again on 31st; whilst at Aberdeen the aggregate for the month was only about 1½ in.

There was not much snow, though here and there on 20th, 28th, and 29th. At times very stormy conditions prevailed, especially between 16th and 21st, and during the last few days. Somewhat serious flooding occurred in some districts on 20th, and on 28th and 29th; and on 17th considerable damage was caused in east and north by abnormally high tides.

Thunder occurred locally in the west between 20th and 29th.

There was a good deal of cloudy weather, with some fog.

General Note.

The outstanding features of 1921 were the long spells of mild or warm weather—only August and November were cold months, the latter not notably so; the very dry weather of June and the first half of July; and the contrast, relatively to the normal, between the rainfall of eastern and western districts. In Mid-Lothian the year's total was practically equal to the normal, but towards south-east there was a deficiency and in north-east an acute shortage. Thus Aberdeen (16·67 in.) had less than three-fifths of the normal, and the year there was not only the driest experienced during the last fifty years, but very much the driest, representing little more than two-thirds of the previous "record" (23·81 in. in 1913). On the other hand, largely on account of the heavy rains of January, March, and December, the year's aggregate was above the normal in western Scotland.

RAINFALL RECORDS FOR 1921 IN INCHES.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Shetland—Lerwick	6.22	4.03	5.06	3.61	2.54	.92	2.09	1.91	8.58	4.58	2.84	5.69	41.92
Orkney—Balfour Castle	4.50	1.00	2.65	1.80	1.80	1.55	1.70	2.15	2.50	8.30	2.75	6.00	31.60
Cathness—Wick	2.82	1.18	1.61	1.02	1.70	1.12	2.42	1.86	8.18	2.81	1.95	4.14	25.26
Sutherland—Tongue	5.29	1.84	8.60	1.89	8.29	1.77	2.65	8.24	4.59	8.97	2.14	6.47	89.54
Dornoch	2.93	.52	2.06	.80	8.17	1.01	2.35	1.44	1.86	2.09	1.46	8.90	28.09
Ross and Cromarty—													
Portrose	2.09	.88	1.22	.65	2.84	.75	2.87	2.14	.67	1.49	.76	4.03	19.34
Ardross Castle	6.13	.88	8.79	1.53	8.26	.84	2.95	2.21	1.55	2.90	1.63	6.00	38.67
Glencarron	17.00	6.82	11.92	8.14	4.70	2.46	4.47	4.98	6.85	10.99	2.66	18.57	95.86
Stornoway	8.15	2.52	6.69	2.60	8.21	1.76	8.21	8.81	4.64	4.82	8.62	8.66	58.09
Inverness—Inverness	4.90	.58	2.16	.62	2.48	1.07	2.29	3.81	2.07	2.06	1.04	8.69	36.26
Alvie Manse	4.15	.91	8.14	1.31	2.10	.91	2.23	2.49	1.64	1.81	2.27	4.68	27.14
Glenuoich	26.82	7.89	18.25	8.80	6.88	2.85	8.01	5.77	9.89	14.62	2.00	26.60	188.13
Fort William	16.85	8.79	14.94	2.27	6.06	1.25	5.71	5.12	5.49	10.78	2.85	15.40	90.51
Nairn—Nairn (Delnies)	8.05	.61	1.70	.56	2.47	.87	1.70	1.98	1.21	2.27	.87	8.64	20.90
Moray—Gordon Castle	3.78	.45	2.04	.68	2.18	1.79	2.27	3.05	1.18	2.44	1.65	2.90	23.86
Grantown	8.18	.70	1.60	1.32	2.12	1.29	2.26	3.47	1.27	2.18	1.80	8.72	24.28
Banff—Banff	2.25	.65	1.79	.91	1.65	1.42	2.00	8.29	1.36	1.97	1.70	2.26	21.25
Aberdeen—Fyvie Castle	1.06	.60	1.94	1.61	1.66	1.51	1.69	2.15	1.80	1.80	3.17	1.83	20.88
Peterhead	1.89	.71	1.92	1.28	1.88	1.08	1.05	1.67	1.84	1.83	2.65	1.94	19.79
Aberdeen (King's Coll.)	1.26	.60	1.95	1.51	1.80	1.10	1.40	1.99	.97	1.48	1.54	1.57	16.67
Balmoral	2.67	.82	2.81	1.09	2.20	.80	2.12	2.88	1.01	1.49	1.98	8.09	21.96
Kincardine—Balmak-													
ewan	1.92	.51	2.44	1.80	1.97	.80	1.76	2.06	1.20	1.57	8.51	1.46	20.50
Forfar—Montrose	1.69	.50	1.99	1.43	2.28	.91	1.78	1.82	1.17	1.89	2.24	.88	18.03
Dundee (E. Necropolis)	2.60	.46	2.20	1.04	1.88	.62	2.14	8.85	1.71	2.42	2.09	1.46	28.47
Forfar	2.10	.71	2.56	1.20	8.18	.45	2.08	3.20	1.03	2.06	2.79	1.61	28.66
Lethathie	3.77	1.46	4.56	1.29	8.65	.54	3.79	5.77	1.91	2.54	4.16	3.22	86.68
Perth—Bonskeld	5.18	.22	4.04	.77	2.28	.70	2.69	4.66	1.66	2.51	2.62	4.77	32.70
Crieff	5.21	.59	4.68	.97	2.66	.42	3.57	6.80	1.82	8.88	8.71	3.42	97.68
Perth	8.82	.32	2.68	.88	1.57	.53	2.43	5.04	1.47	8.17	2.08	2.77	26.81
Killin	13.48	1.79	18.50	1.07	4.34	.56	4.27	6.28	8.65	5.38	8.88	13.29	71.44
Aberfoyle	10.80	1.45	10.05	1.45	4.25	.80	4.55	8.45	2.80	6.45	5.45	9.85	68.65
Fife—Cupar	3.63	.84	2.92	.96	1.25	.50	2.12	8.24	1.07	2.67	1.42	1.73	21.25
Kinross—Loch Leven	5.19	.38	8.58	1.09	1.65	19	2.45	6.10	2.06	8.59	2.65	8.68	32.20
Clackmannan—													
Alloa Waterworks	4.82	.48	8.60	.76	2.05	.15	2.95	5.25	2.75	8.85	2.40	4.55	38.60
Argyll—Gruline (Mull)	18.76	8.92	9.94	4.68	4.49	2.12	6.18	4.19	4.78	7.93	5.85	10.27	77.46
Oban	9.43	2.18	7.58	2.39	4.86	.99	4.18	8.81	8.78	6.68	2.80	8.06	56.69
Glencorby Manse	16.88	5.79	12.85	2.40	6.42	2.32	6.76	6.78	6.46	9.02	8.40	18.96	97.74
Ardishalg	11.91	2.80	10.85	2.36	4.32	1.67	4.74	6.84	3.78	6.82	6.04	11.35	72.71
Campbeltown	5.92	1.80	6.89	2.27	3.35	.77	4.76	6.42	2.48	5.92	6.47	7.65	57.05
Bute—Rothesay	8.58	2.08	6.49	1.84	8.94	1.18	5.52	6.72	8.32	5.80	8.73	9.01	57.61
Stirling—Stirling	6.26	.59	5.78	1.06	2.43	.26	8.67	5.82	1.85	8.46	2.93	5.07	38.88
Kilsyth	8.81	1.75	7.46	1.62	2.48	.44	4.48	7.64	2.24	6.43	8.02	8.13	54.45
Dumbarton—													
Helensburgh	10.02	1.94	6.88	1.48	8.51	.71	5.65	7.80	8.09	5.17	4.88	10.80	61.98
Renfrew—Greenock	11.83	2.03	11.62	1.99	8.94	.75	5.16	7.08	8.10	6.47	4.06	11.57	69.67
Paisley	8.81	1.82	7.07	1.02	2.58	.49	4.22	6.00	1.85	5.45	3.19	7.22	48.75
Ayr—													
Kilmarnock (Agric. Coll.)	7.86	1.79	5.66	1.29	2.65	1.18	8.94	6.01	2.27	4.84	2.36	6.96	45.81
Ayr	6.80	.90	6.03	1.81	3.18	.89	4.09	5.69	2.60	4.30	1.88	6.22	42.64
Colmonell (Knockdolian)	6.70	.72	6.20	1.61	2.25	.83	4.74	4.37	1.91	4.55	8.69	6.44	44.41
Mul Kirk	10.50	1.12	7.34	1.85	2.64	.72	8.56	6.56	2.44	4.44	1.71	8.77	51.15
Lanark—													
Airdrie	6.66	.76	4.68	1.83	2.02	.49	3.81	5.86	2.77	5.88	2.10	6.31	41.67
Dungavel	14.20	1.46	10.87	1.04	1.77	.92	8.97	8.07	5.57	8.66	2.81	18.08	68.77
Leadhills	18.17	2.04	12.85	1.99	4.11	1.10	6.42	11.28	2.88	4.88	8.29	11.87	75.33
Linthgow—Linth-													
gow	5.93	.59	4.33	1.24	2.15	.85	2.37	6.52	1.94	4.51	2.08	4.82	36.98
Mid-Lothian—													
Edinburgh (University)	4.18	.43	2.47	.71	1.54	.87	2.85	4.13	1.55	4.18	.97	2.91	25.74
Balerno (Cockburn Hill)	6.84	.89	8.43	.87	1.86	.48	2.12	5.07	2.89	4.09	1.32	5.61	34.43
Haddington—North													
Berwick	3.71	.80	1.78	.72	1.71	.57	2.19	1.77	1.89	3.48	1.06	2.02	22.05
Stobshiels Reservoir	4.32	2.40	2.94	1.49	2.15	.68	2.16	5.81	1.57	8.85	2.45	8.11	80.78
Berwick—Marchmont	8.97	.60	2.85	.68	1.99	.72	2.97	4.47	1.89	8.30	1.99	2.55	29.18
Coldstream	3.66	1.22	1.87	.55	1.58	.61	2.55	5.86	1.74	2.66	1.45	1.59	28.74
Peebles—Stobo Castle	7.69	.51	4.27	1.15	1.81	.55	8.32	6.74	1.71	4.14	1.52	5.81	38.65
Selkirk—Fairlie	4.88	.28	8.61	.47	2.16	.45	8.96	5.13	1.47	8.40	1.71	2.84	29.35
Roxburgh—													
St Boswells (Fens)	4.00	.15	8.08	.88	1.20	.61	2.62	4.21	1.59	2.55	1.85	2.04	22.83
Kelso (Broomlands)	4.28	.27	1.83	.57	1.47	.76	2.80	4.76	1.40	2.66	1.28	1.96	28.49
Dumfries—Dumfries	6.65	.59	5.04	.90	2.61	.36	4.99	6.05	1.76	2.49	2.30	4.67	38.11
Drumlanrig	8.08	1.18	7.29	1.47	3.92	.48	8.81	7.66	1.32	4.20	2.63	7.29	47.77
Castle Milk	8.08	.20	8.66	1.33	1.92	.51	4.33	5.08	1.82	2.69	2.40	5.14	37.08
Langholm	11.87	.88	7.84	1.72	2.71	.73	4.97	6.79	2.82	4.14	2.97	9.48	55.42
Kirkcudbright—Car-													
gen	8.81	.42	6.82	1.26	8.82	.45	6.37	7.40	2.25	8.85	8.05	6.27	49.17
Dalbeattie (Kirkcannan)	8.85	.50	6.80	1.87	2.98	.37	4.46	7.81	2.87	2.62	3.87	5.52	48.77
Carstairs (Shiel)	16.42	1.72	18.70	8.81	4.06	1.19	6.38	9.77	8.70	5.80	5.94	13.96	84.45
Wigtown—Monreith	6.20	.56	4.48	1.08	1.05	.46	4.08	5.56	2.15	8.82	8.16	4.00	26.50

AGRICULTURAL STATISTICS.—RETURNED UPON 4TH JUNE 1921.—(Compiled from the Government Returns).

TABLE No. 1.—ACREAGE UNDER CROPS AND GRASS IN EACH COUNTY OF SCOTLAND.

COUNTIES.	Total Acreage under Cereals and Grass.		Arable Land.		Permanent Grass.		Wheat.		Barley including Bere.		Oats.		Mixed Grain.		Rye.		Beans.		Peas.		Tato.		Potatoes.		Turnips and Swedes.		Mangels.		Cabbage.		Rape.		Vetches or Tares (Seed).		Vetches, Tares, Beans, Muehlen, &c. (Podder).		Small Fruit.		Rye-Grasses and other Rotation Grasses and Clover.		Other Crops.		Bare Fallow.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.	Acre.	Acres.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Aberdeen	627,444	594,978	32,466	38	23,332	191,763	2	159	8	59	215,421	7,035	82,033	3	139	65	41	286,014	231	286,014	232	314																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Angus	325,881	316,902	9,979	1	1,292	17,177	14	364	30	6	47,885	5,443	5,290	33	24	265	41	25,960	15	25,960	30	440																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Argyll	131,992	146,000	167,992	1,418	1,432	45,639	1	38	270	6	47,885	5,443	5,290	33	24	265	41	25,960	15	25,960	30	440																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Barr	186,803	143,683	43,120	1	8,494	45,639	1	38	270	6	47,885	5,443	5,290	33	24	265	41	25,960	15	25,960	30	440																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Bell	190,229	193,666	50,363	3,697	17,715	81,516	1	61	458	34	95,412	2,714	22,347	181	63	1,269	9	68,711	11	68,451	18	91																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Bell	25,398	16,373	9,025	4	7	5,172	1	24	23	1	5,231	1,159	1,800	8	15	97	1	8,456	11	8,456	16	64																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							</

TABLE No. 2.—TOTAL PRODUCE OF WHEAT, BARLEY, AND OATS, ACREAGE AND YIELD PER ACRE in the Year 1920, compared with the Yield for the Years 1919 and 1918, and the AVERAGE of the Ten Years, 1910-1919, in each COUNTY of SCOTLAND.

COUNTIES.	WHEAT.										BARLEY, INCLUDING BEER.										OATS.										Average of the Ten Years.
	Total Produce in 1920.	Acreage in 1920.	Yield per acre.			Average of the Ten Years.	Qrs.	Total Produce in 1920.	Acreage in 1920.	Yield per acre.			Average of the Ten Years.	Qrs.	Total Produce in 1920.	Acreage in 1920.	Yield per acre.			Average of the Ten Years.											
			1920.	1919.	1918.					1920.	1919.	1918.					1920.	1919.	1918.												
Aberdeen	130	33	31.5	41.1	31.2	31.6	124,000	21,772	33.4	31.5	32.3	33.4	879,000	190,938	36.5	33.7	37.6	36.5	33.7	37.6	36.5										
Argyll	..	..	..	..	..	..	7,500	1,511	34.2	33.2	37.7	42.0	77,000	18,114	33.9	34.8	33.8	33.9	34.8	33.8	33.9				
Ayr	6,200	1,104	44.6	47.7	46.8	45.9	25,000	5,549	37.8	46.1	40.7	47.8	251,000	47,490	42.3	49.9	47.8	42.3	49.9	47.8	42.3										
Barr	..	..	28.7	40.0	..	..	47,000	9,505	39.9	40.5	36.5	34.0	138,000	48,636	39.2	37.7	42.1	39.2	37.7	42.1	39.2						
Berkirk	14,000	3,031	37.9	38.4	39.5	38.0	97,000	20,543	37.6	31.9	30.6	33.1	257,000	82,073	39.2	34.1	36.0	39.2	34.1	36.0	39.2										
Bute	150	27	42.8	40.0	43.7	44.4	2,693	51	40.0	42.0	42.2	39.2	37,000	8,194	41.5	45.4	42.7	41.5	45.4	42.7	41.5										
Caithness	..	..	..	..	..	..	5,000	1,196	33.7	31.0	30.2	30.5	192,000	31,894	30.6	31.1	31.1	30.6	31.1	31.1	30.6				
Clackmannan	2,300	445	41.0	38.2	39.6	43.3	1,303	266	33.9	36.9	37.9	35.7	17,000	3,507	37.6	38.0	40.7	37.6	38.0	40.7	37.6										
Dumfriesshire	3,700	888	35.2	36.2	38.7	37.6	1,140	31	35.9	36.9	44.9	34.7	44,000	8,621	30.7	37.6	43.4	30.7	37.6	43.4	30.7										
Dumfriesshire	500	116	35.3	36.8	39.7	39.1	3,660	742	39.0	38.2	38.7	37.3	212,000	47,663	38.0	36.2	41.7	38.0	36.2	41.7	38.0										
Fife	49,000	10,894	35.7	38.0	40.4	36.7	101,000	18,031	44.8	42.1	40.7	37.6	292,000	44,629	47.4	43.2	51.1	47.4	43.2	51.1	47.4										
Forfar	40,000	8,995	35.5	33.2	37.7	36.9	105,000	22,004	36.7	30.3	36.2	35.2	338,000	57,241	46.5	45.2	53.4	46.5	45.2	53.4	46.5										
Haddington	22,000	4,050	43.8	41.0	42.7	42.3	105,000	17,702	47.6	43.6	43.9	43.3	138,000	18,747	56.8	45.1	49.1	56.8	45.1	49.1	56.8										
Inverness	600	111	40.0	39.5	40.4	38.8	23,000	6,096	29.6	24.7	25.6	26.9	104,000	29,652	28.0	28.2	32.5	28.0	28.2	32.5	28.0										
Kincardine	4,500	1,070	38.8	36.4	38.8	37.0	62,000	13,091	38.2	39.2	34.8	33.2	137,000	30,521	41.2	36.8	39.6	41.2	36.8	39.6	41.2										
Kirkcubright	900	21	40.5	40.3	39.0	43.0	2,100	411	40.7	36.9	38.3	36.3	46,000	8,159	44.8	39.2	42.0	44.8	39.2	42.0	44.8										
Kirkcubright	90	21	38.9	37.1	38.6	37.5	900	188	38.5	40.5	41.1	38.0	128,000	28,900	36.3	34.7	42.0	36.3	34.7	42.0	36.3										
Linlithgow	11,000	2,696	32.1	35.9	38.0	35.8	1,200	296	31.7	36.4	38.3	34.2	259,000	46,098	44.9	48.4	43.9	44.9	48.4	43.9	44.9										
Mid-Lothian	12,000	2,219	41.7	41.8	43.3	42.5	18,000	5,001	48.8	46.4	42.7	43.2	30,000	12,114	52.6	48.2	49.9	52.6	48.2	49.9	52.6										
Moray	23,000	5,580	43.0	40.7	43.6	44.6	41,000	7,629	42.9	40.7	41.1	41.7	136,000	22,468	48.5	42.1	45.7	48.5	42.1	45.7	48.5										
Moray	3,000	560	41.8	37.5	40.2	40.4	52,000	10,784	38.7	36.6	36.6	34.6	132,000	24,659	42.9	39.2	43.8	42.9	39.2	43.8	42.9										
Nairn	120	25	40.0	36.0	35.0	34.7	7,300	2,465	28.8	30.8	33.6	30.2	24,000	6,364	30.6	32.4	34.2	30.6	32.4	34.2	30.6										
Orkney	..	..	..	..	..	..	15,000	4,154	28.8	30.8	30.0	31.5	194,000	34,603	28.6	28.3	29.8	28.6	28.3	29.8	28.6				
Peebles	..	..	..	..	..	..	2,700	625	34.1	32.0	31.5	31.8	35,000	7,996	37.2	30.3	33.3	37.2	30.3	33.3	37.2				
Peebles	..	..	..	..	..	..	30,000	6,480	36.4	34.4	37.0	35.4	425,000	77,996	43.5	48.1	46.2	43.5	48.1	46.2	43.5				
Perth	37,000	7,752	38.3	40.4	38.7	40.4	400	80	40.0	36.3	37.9	37.6	66,000	12,351	43.1	42.5	42.4	43.1	42.5	42.4	43.1										
Renfrew	11,000	2,073	43.4	39.5	42.1	42.1	43,000	9,681	35.7	32.5	30.6	30.6	166,000	32,769	40.5	38.9	40.5	40.5	38.9	40.5	40.5										
Ross and Cromarty	4,200	779	43.5	43.4	43.9	41.8	56,000	12,354	36.4	38.0	38.0	35.5	137,000	28,683	38.3	33.9	41.8	38.3	33.9	41.8	38.3										
Roxburgh	2,500	577	35.1	37.9	40.3	35.9	2,800	479	37.7	40.0	38.8	34.3	19,000	4,607	33.4	28.5	40.3	33.4	28.5	40.3	33.4										
Seikirk	100	18	43.8	39.0	40.0	34.4	3,500	857	32.4	22.0	21.8	23.9	28,000	6,364	38.2	17.9	21.3	38.2	17.9	21.3	38.2										
Shetland	..	..	..	..	..	..	3,000	1,664	38.9	45.7	38.9	40.7	106,000	21,240	39.9	44.0	39.1	39.9	44.0	39.1	39.9				
Stirling	9,600	2,020	38.0	45.4	40.0	43.8	8,100	1,623	35.8	27.9	34.5	32.3	33,000	7,850	32.6	24.6	36.2	32.6	24.6	36.2	32.6										
Strathclyde	..	..	..	..	..	..	2,500	623	35.8	37.9	34.5	32.3	33,000	7,850	32.6	24.6	36.2	32.6	24.6	36.2	32.6				
Strathclyde	..	..	..	..	..	..	1,800	368	38.8	39.4	39.3	39.4	185,000	34,777	42.5	44.4	46.5	42.5	44.4	46.5	42.5				
Wigtown	..	..	..	..	..	..	979,000	204,369	38.1	35.2	35.4	35.1	5,157,000	1,092,198	40.0	38.2	41.5	40.0	38.2	41.5	40.0				
Total	260,000	54,859	38.2	38.5	40.6	39.5	979,000	204,369	38.1	35.2	35.4	35.1	5,157,000	1,092,198	40.0	38.2	41.5	40.0	38.2	41.5	40.0										

* Average of 9 years only.

† Average of 8 years only.

‡ Average of 6 years only.

† Average of 6 years only.

† Average of 8 years only.

* Average of 9 years only.

TABLE NO. 3.—TOTAL PRODUCE OF BEANS, PEAS, AND POTATOES, ACREAGE AND YIELD PER ACRE in the Year 1920, compared with the YIELD for the Years 1919 and 1918, and the AVERAGE of the Ten Years, 1910-1919, in each COUNTY of SCOTLAND.

COUNTIES.	BEANS.					PEAS.					POTATOES.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	Total Produce in 1920.*	Yield per acre.			Average of the Ten Years, 1910-1919.	Total Produce in 1920.	Yield per acre.			Average of the Ten Years, 1910-1919.	Total Produce in 1920.	Yield per acre.			Average of the Ten Years, 1910-1919.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
		Qrs.	Acres.	Bush.			Qrs.	Acres.	Bush.			Qrs.	Acres.	Bush.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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Aberdeen</

* Exclusive of a certain acreage, not ascertainable, the produce of which was cut green.

† Average of 9 years only.

‡ Average of 7 years only.

§ Average of 8 years only.

¶ Exclusive of 286 acres, the produce of which was cut or picked green.

TABLE No. 4.—TOTAL PRODUCE OF TURNIPS (including SWEDS) and MANGELS, ACREAGE and YIELD per Acre in the Year 1920, compared with the YIELD for the Years 1919 and 1918, and the AVERAGE of the Ten Years, 1910-1919, in each COUNTY of SCOTLAND.

COUNTIES.	TURNIPS AND SWEDS.					MANGELS.					
	Total Produce in 1920.	Acres in 1920.	Yield per Acre.			Average of the Ten Years, 1910-1919.	Total Produce in 1920.	Acres in 1920.	Yield per Acre.		
			1920.	1919.	1918.				1920.	1919.	1918.
Tons.	Acres.	Tons.	Tons.	Tons.	Acres.	Tons.	Tons.	Tons.	Tons.	Average of the Ten Years, 1910-1919.	
Aberdeen	1,494,000	83,859	17.8	19.3	12.2	15.5	170	18	25.0	16.2	18.3
Argyll	73,000	5,645	13.0	16.4	16.4	16.4	9.4	18	25.0	16.2	18.3
Ayr	111,000	7,828	14.2	20.0	21.0	21.4	14.2	359	15.0	20.1	22.5
Barr	372,000	20,475	18.1	17.9	12.5	15.6	15.7	14.0	16.1	14.0	15.7
Barwick	514,000	23,390	22.0	18.4	16.0	18.1	18.1	212	18.1	15.1	16.3
Bute	18,000	1,286	14.2	16.3	16.3	16.7	120	9	18.8	16.2	15.8
Gathness	190,000	11,903	15.9	20.0	11.6	17.2	12	1	13.0	12.0	10.5
Glackmannan	14,000	770	18.2	18.8	15.2	15.1	12	13	20.5	25.5	21.4
Dumbarnton	25,000	1,415	17.7	20.0	19.5	20.7	270	13	15.1	17.2	18.4
Dumries	473,000	16,311	17.3	18.6	19.0	16.4	3,500	229	18.7	16.6	12.6
Forfar	735,000	31,569	23.1	14.0	14.8	16.6	520	28	18.7	16.3	15.9
Headington	31,809	23.1	14.0	16.7	18.8	18.8	280	14	21.1	15.9	15.3
Inverness	187,000	13,502	15.9	15.1	11.7	17.2	6,100	287	16.0	17.0	11.3
Kincardine	273,000	9,626	16.8	14.8	10.4	13.6	50	8	17.1	17.3	12.9
Kinross	43,000	16,213	17.8	23.4	13.9	14.1	1	1	16.0	17.0	18.8
Kirkcubright	163,000	2,542	15.2	14.6	15.7	16.8	76	17.6	18.1	20.5	19.3
Lenark	193,000	9,810	19.7	18.0	19.3	16.3	160	15	11.0	12.0	10.1
Midlothian	73,000	3,284	22.3	16.4	16.2	18.0	210	8	23.9	23.6	22.1
Moray	185,000	9,743	19.0	15.0	13.0	17.4	1,100	47	25.7	19.3	23.7
Nairn	243,000	14,120	17.2	16.1	10.9	16.6	140	8	17.1	17.8	12.9
Orkney	63,000	3,885	16.1	14.0	10.0	13.8	50	3	16.0	8.0	12.4
Perth	131,000	18,362	9.5	8.6	6.0	10.1	1	1	16.0	8.0	12.4
Perthshire	65,000	3,408	18.9	17.1	16.8	18.4	1	1	16.0	8.0	12.4
Perthshire	486,000	26,950	18.6	14.6	14.0	16.9	39	17.5	18.0	16.0	17.4
Perthshire	41,000	2,231	18.5	19.0	18.3	18.5	270	14	19.2	19.2	17.5
Ross and omarty	257,000	14,916	17.2	17.4	12.5	15.4	140	8	18.0	19.5	11.7
Roxburgh	361,000	19,602	18.4	12.3	11.8	14.8	1,000	66	15.4	14.2	17.9
Selkirk	46,000	2,458	18.7	15.5	18.4	14.5	50	3	16.0	8.0	12.4
Shetland	15,000	1,063	14.2	10.8	9.5	11.4	1	1	16.0	8.0	12.4
Stirling	106,000	3,968	26.7	25.3	24.9	26.5	800	15	19.9	24.5	24.6
Struthland	47,000	2,767	16.9	18.2	9.0	14.7	1	1	16.0	8.0	12.4
Wigtown	154,000	14,157	16.9	15.7	17.2	17.0	3,400	293	11.7	14.6	22.6
Total	7,662,000	425,255	18.1	16.8	13.9	16.3	29,000	1,768	16.4	17.0	19.6

* Average of 7 years only.

† Average of 9 years only.

‡ Average of 6 years only.

TABLE No. 5.—TOTAL PRODUCE OF HAY from Ryegrass and other Rotation Grasses and Clover, also Total from Permanent Grass, Acreage, and Yield per Acre in the Year 1920, compared with the YIELD for the Years 1919 and 1918, and the AVERAGE of the Ten Years, 1910-1919, in each County of SCOTLAND.

FROM CLOVER, SAINFOIN, AND GRASSES.										FROM PERMANENT GRASS.				
COUNTIES.	Total Produce in 1920.	Acres in 1920.	Yield per Acre.			Average of the Ten Years, 1910-1919.	Total Produce in 1920.	Yield per Acre.			Average of the Ten Years, 1910-1919.			
			1920.	1919.	1918.			1920.	1919.	1918.				
Tons.	Acres.	Cwts.	Cwts.	Cwts.	Cwts.	Tons.	Acres.	Cwts.	Cwts.	Cwts.				
Aberdeen	75,050	50,228	30.0	23.2	28.1	28.3	1,289	1,289	24.4	17.1	21.9	22.0		
Argyll	17,000	12,403	27.7	22.4	27.5	27.5	20,740	20,740	29.7	20.7	28.6	30.7		
Argyllshire	56,000	32,026	34.2	23.4	27.5	31.2	46,000	46,000	42.5	36.6	38.9	41.8		
Banff	15,000	9,821	31.1	23.9	27.7	28.7	2,920	2,920	22.0	20.2	23.2	17.6		
Berwick	11,275	7,729	30.1	20.5	29.3	31.3	1,960	1,960	22.0	16.6	23.1	23.7		
Bute	4,800	2,729	37.7	37.4	37.6	36.2	1,160	1,160	33.6	34.6	35.7	33.3		
Caithness	7,900	10,156	15.5	16.0	16.8	18.9	742	742	6.7	7.1	8.4	9.8		
Clackmannan	2,800	1,875	41.4	35.4	39.8	41.1	3,170	1,923	48.3	39.8	43.4	42.0		
Dumfries	11,040	6,145	27.0	20.7	28.9	28.0	2,011	2,011	35.1	29.2	34.6	34.6		
Dumfriesshire	30,000	21,851	28.3	20.7	26.0	24.8	23,200	17,896	28.0	20.5	25.0	25.5		
Forfar	27,425	17,425	41.7	33.3	38.0	36.6	5,000	2,767	36.0	25.5	34.9	31.4		
Glasgow	41,000	22,502	36.7	29.1	36.7	34.6	1,964	1,964	28.4	26.4	28.4	26.3		
Haddington	25,000	10,631	47.1	39.3	43.1	45.6	1,940	1,940	35.9	27.1	35.3	31.7		
Inverness	18,000	11,797	22.5	18.4	21.3	21.3	8,510	8,510	21.0	18.4	20.0	18.9		
Kincardine	24,000	13,155	36.7	26.6	33.2	27.2	2,490	2,490	44.7	24.9	18.4	18.4		
Kinross	6,000	3,098	35.5	30.3	33.1	33.2	1,357	1,357	39.2	30.8	32.1	32.7		
Kirkcubright	15,000	10,969	26.9	17.2	23.3	24.9	15,967	11,844	27.1	19.3	25.0	25.1		
Laurel	63,000	34,489	36.2	30.3	32.3	31.9	23,500	13,554	34.7	29.3	31.3	30.3		
Leathard	7,613	44.3	37.6	27.6	43.0	43.0	2,740	2,740	43.5	36.5	37.0	36.4		
Linlithgow	28,000	12,504	45.3	39.2	40.2	46.2	2,509	2,509	37.4	29.6	35.5	33.7		
Mid-Lothian	6,800	3,658	24.2	16.6	27.4	30.1	260	260	21.3	18.7	26.5	25.4		
Moray	1,600	1,487	21.0	17.3	17.1	20.0	70	70	14.0	14.0	15.0	15.8		
Nairn	6,600	8,461	14.0	16.5	17.9	19.1	100	100	5.2	4.8	5.7	5.8		
Orkney	5,100	2,821	36.1	23.5	26.7	29.9	2,200	1,842	33.0	20.8	27.6	29.5		
Perth	58,000	34,608	33.2	28.5	31.4	30.2	16,400	11,940	28.9	25.8	29.0	26.0		
Perthshire	19,000	9,973	37.2	33.2	38.7	39.0	16,500	7,307	46.5	35.9	41.9	38.3		
Renfrew	14,000	14,147	30.1	18.6	22.4	22.3	1,901	2,152	17.5	16.0	18.0	16.2		
Ross and Cromarty	17,000	9,559	34.4	22.9	30.2	31.3	11,400	6,906	32.9	22.4	25.0	26.8		
Roxburgh	2,800	1,600	34.4	21.3	29.4	30.7	2,730	1,858	29.7	20.2	24.3	26.1		
Selkirk	2,414	1,414	32.9	14.5	24.7	22.9	1,800	1,670	21.1	12.5	25.8	19.7		
Shetland	23,000	11,983	36.9	33.0	37.3	35.8	17,000	7,970	46.0	34.5	39.7	35.8		
Stirling	4,600	4,700	19.7	16.3	17.8	18.1	1,000	1,543	13.5	8.9	10.7	15.2		
Sutherland	7,500	5,843	28.0	19.8	25.1	30.5	6,200	4,406	28.1	22.9	29.7	29.9		
Wigtown														
Total	694,000	425,256	32.6	26.4	30.5	30.8	248,000	152,164	32.6	25.8	30.1	29.7		

TABLE NO. 6.—NUMBER OF HORSES, CATTLE, SHEEP, AND PIGS IN EACH COUNTY OF SCOTLAND AS RETURNED ON JUNE 4, 1921.

COUNTIES.	HORSES (including Ponies).					CATTLE.					SHEEP.			PIGS.				
	Used solely for Agric. &c.	Unbroken Horses. 1 Year & Under above.	Horses. 1 Year & Under above.	Other Horses.	Cows in Milk.	Cows in Calfr. but not in Milk.	Held in Calfr.	Bulls & Heifers for Service.	Other Cattle.		Ewes kept for Breeding.	Rams to be used for Service.	1 Year Old and above.	Under 1 Year.	Hogs kept for Breeding.	Boars used for Service.	Other Pigs.	
									2 Years & above.	1 Year & under 2 Years.								
Aberdeen	20,968	57	7,364	2,205	2,946	36,812	2,843	3,205	1,848	44,696	43,861	72,833	2,167	31,207	85,889	2,041	221	12,611
Argyll	4,154	25	1,641	548	666	17,772	1,941	2,013	1,969	10,300	10,894	359,169	8,816	186,968	273,658	483	62	3,960
Ayr	7,294	58	2,185	686	1,691	44,665	6,287	9,891	2,553	10,300	17,186	20,469	3,958	146,041	146,041	1,154	98	10,170
Banff	5,969	12	2,086	729	730	10,374	960	851	483	7,919	12,618	22,591	737	44,537	24,957	549	49	3,149
Bervick	3,832	7	692	143	529	2,610	260	611	271	5,956	3,041	2,467	114,882	40,247	160,203	654	91	8,675
Bute	922	6	332	94	139	2,902	323	588	193	1,163	2,197	2,274	17,613	451	16,233	75	12	648
Caithness	3,985	13	4,243	444	466	5,771	513	376	168	2,116	5,192	5,889	56,214	1,505	59,854	260	22	1,587
Clackmannan	489	8	187	70	65	908	131	142	52	877	587	442	6,179	183	6,354	98	13	436
Dumfriesshire	1,365	12	368	114	247	5,630	1,181	853	303	1,861	1,735	1,822	5,610	937	25,100	167	30	1,011
Dumfries	5,996	84	1,848	595	1,344	18,233	1,625	6,233	1,237	10,030	13,367	14,062	293,085	5,761	293,528	1,138	77	8,516
East Lothian	2,966	7	432	110	271	1,845	901	1,312	145	5,032	1,694	1,245	43,336	1,547	67,744	887	38	1,985
Fife	7,122	31	2,105	588	1,563	9,074	1,266	1,581	605	13,774	7,458	12,075	1,368	13,455	43,432	1,159	130	6,182
Forfar	7,675	31	1,686	379	1,138	9,384	1,584	889	448	18,292	8,091	6,317	61,610	2,408	69,666	1,063	88	6,274
Inverness	6,260	43	1,874	631	548	15,915	2,658	1,167	564	5,065	8,305	11,096	220,544	7,187	175,611	288	38	1,547
Kilbairdine	3,762	6	1,003	258	492	6,980	467	448	274	6,980	6,512	4,822	15,086	495	67,992	345	34	2,257
Kinross	866	6	213	104	133	1,128	118	279	84	1,340	1,510	870	11,105	855	12,741	101	15	647
Kirkcudbright	3,520	50	1,279	390	781	16,501	899	5,419	1,050	9,813	10,349	9,591	151,843	4,158	151,167	940	89	10,019
Lanark	6,908	59	1,667	586	1,327	27,810	6,071	5,314	1,719	8,693	9,581	10,972	93,643	2,656	95,365	968	101	6,318
Leith	1,547	9	510	166	339	8,955	602	781	263	2,160	1,486	1,599	8,885	93	5,491	207	34	1,582
Midlothian	3,996	13	616	166	787	7,641	732	611	255	2,878	1,955	1,865	64,100	1,777	76,915	1,275	145	5,796
North Ayrshire	8,448	18	1,194	367	418	5,402	417	443	253	4,580	6,267	4,712	18,483	542	18,194	284	17	1,991
North Lanark	910	1	323	112	165	1,701	142	80	121	570	1,449	1,757	5,297	221	4,828	118	18	715
Orkney	4,851	17	1,176	564	708	7,946	847	808	240	4,558	8,278	7,693	12,654	387	15,298	204	16	1,698
Peebles	817	8	212	67	170	1,568	146	133	618	1,117	1,463	1,382	68,669	924	15,204	34	6	447
Penrith	9,755	42	2,498	755	1,302	18,421	1,846	1,822	968	14,926	15,328	13,520	250,061	2,024	218,568	1,222	165	7,592
Perth	2,220	33	635	174	509	11,324	2,923	2,140	600	2,267	3,197	3,246	115,160	3,406	127,116	393	40	2,471
Ross & Cromarty	5,364	15	1,157	356	550	19,489	1,831	1,260	393	5,863	7,357	8,072	204,101	5,110	96,552	477	65	2,656
Shetland	3,196	11	563	133	771	9,901	1,409	1,741	304	5,468	3,675	3,365	204,101	5,110	239,939	442	35	2,589
Selkirk	497	50	89	27	100	949	55	152	64	424	693	749	81,141	1,658	81,258	91	7	567
Shetland	2,355	50	291	180	2,010	5,078	867	598	115	1,785	2,441	2,687	60,095	2,449	57,331	52	10	507
Stirling	8,302	38	1,117	361	611	8,174	1,571	1,840	617	1,785	5,513	4,587	48,609	1,466	47,652	405	32	2,123
South Ayrshire	1,761	4	802	101	221	3,669	1,471	832	61	7,074	1,775	2,183	83,818	2,848	72,904	80	12	495
Wigtown	3,765	50	1,446	480	742	25,489	336	2,556	1,085	7,705	7,369	8,675	48,869	1,872	47,445	808	117	10,375
Total	189,217	774	30,845	12,677	24,608	346,495	41,724	54,829	18,463	228,173	232,262	221,180	2,814,812	80,070	2,733,915	17,962	1,927	135,609

* Including Mares kept for breeding.

† Used for service in 1921.

TABLE NO. 7.—QUANTITY AND VALUE OF CORN, &c., imported into the United Kingdom in the undermentioned Years.

[From Trade and Navigation Returns.]

	Quantities.			Values.		
	1919.	1920.	1921.	1919.	1920.	1921.
Wheat from—	Cwt.	Cwt.	Cwt.	£	£	£
Russia . . . . .	..	2,400	..	..	3,282	..
Germany . . . . .	..	..	100	..	..	187
United States	31,769,300	45,422,300	36,065,002	30,901,414	69,838,106	31,523,056
Chile . . . . .	..	..	323,800	..	..	275,988
Argentine Republic . .	6,819,100	30,830,800	4,080,560	6,353,666	38,364,688	3,518,144
British East Indies . .	100	20,000	2,668,600	..	35,000	2,775,274
Australia	14,952,700	19,966,100	19,993,015	13,623,692	18,655,968	17,676,886
New Zealand . . . . .	..	4,900	..	..	5,760	..
Canada	17,864,900	10,189,400	14,589,820	17,509,824	15,581,846	12,216,573
Other countries	36,900	2,892,426	2,526,594	84,876	4,288,720	2,369,873
Total	71,448,000	108,328,326	80,246,994	68,422,509	146,753,350	70,855,484
Wheat, meal, and flour, from—						
Germany . . . . .	..	..	20	..	..	26
Belgium . . . . .	..	..	19,500	..	..	15,280
France . . . . .	..	..	18,600	..	..	12,846
Hungary . . . . .	..	..	600	..	..	809
United States	10,274,070	5,837,400	7,900,142	14,923,818	10,872,260	9,407,971
Argentine Republic . .	68,100	183,918	114,787	75,079	228,280	96,491
Australia	1,577,000	1,481,200	1,880,700	2,289,891	2,325,722	1,627,425
Canada	5,566,100	2,318,601	5,866,019	8,122,795	4,413,435	7,126,745
Other countries	225,800	2,148,621	540,137	317,661	3,406,284	779,506
Total	17,711,070	11,969,740	15,840,455	25,729,244	21,245,981	19,067,049
Barley	16,643,900	12,667,700	15,805,952	17,836,657	14,458,164	10,523,488
Oats	6,711,421	6,101,600	8,356,836	6,723,957	5,632,721	4,402,820
Peas	1,136,551	582,663	1,812,984	2,583,569	1,057,587	1,646,497
Beans, other than Haricot	730,975	..	2,664,729	875,150	1,690,277	1,516,188
Indian corn or maize . .	16,860,900	33,840,160	36,754,888	13,792,083	27,871,234	18,460,100
Indian corn meal	2,313,768	1,751,220	..	2,252,466	1,974,107	1,425,955
Oatmeal	1,375,368	677,984	847,947	2,320,328	1,320,576	1,207,854
Offals of corn and grain, including rice-meal	3,768,700	..	..	3,125,662	..	..
Rice, exclusive of rice-meal—						
From Brit. East Indies	1,411,203	2,474,608	3,764,170	1,730,264	4,786,881	3,460,392
From other countries	612,920	478,555	3,008,562	1,251,981	1,397,038	2,952,800
Other kinds of grain and corn	2,003,894	1,047,889	1,125,408	3,075,307	1,192,914	1,020,046
Other kinds of meal and flour	53,768	..	..	102,065	..	..
Total of corn, &c. . .	53,622,928	59,622,379	78,730,971	55,599,434	60,881,409	135,968,717

TABLE NO. 8.—RETURN OF THE AVERAGE PRICES OF WOOL in the Year 1920 and 1921.

Years.	Australian.	South African.	English Fleeces.
	Per lb.	Per lb.	Per lb.
	s. d.	s. d.	s. d.
1920	2 0½	2 6½	2 11 to 4 8½
1921	1 2½	1 1½	0 9½ to 1 8½

TABLE No. 9.—QUANTITIES AND VALUES OF CORN, MEAT, FOOD PRODUCTS, AND ARTICLES AFFECTING AGRICULTURE, imported into the United Kingdom in the Year 1921, with the Corresponding Figures for 1919 and 1920.

[From Trade and Navigation Returns.]

	Quantities.			Values.		
	1919.	1920.	1921.	1919.	1920.	1921.
ANIMALS, LIVING:—	No.	No.	No.	£	£	£
Cattle . . . . .	..	..	66,674	..	..	2,756,193
Sheep and lambs . . . . .	..	..	10,706	..	..	48,234
Pigs . . . . .	..	..	..	..	..	..
Total value . . . . .	..	..	..	..	..	2,804,427
GRAIN, FLOUR, &c. :—	Cwt.	Cwt.	Cwt.	£	£	£
Wheat	71,443,900	109,328,326	80,246,994	68,422,509	146,753,850	70,355,481
Wheat, meal, and flour	17,692,170	11,969,740	15,840,455	25,729,244	21,245,981	19,067,049
Barley	16,643,900	12,667,700	15,805,952	17,886,637	14,458,164	10,523,488
Oats	6,711,421	6,101,000	8,356,836	6,723,957	5,682,721	4,402,820
Peas	1,136,551	582,663	1,312,984	2,583,560	1,057,587	1,646,497
Beans	730,975	1,280,300	2,664,729	875,150	1,690,277	1,516,186
Maize or Indian corn	16,860,900	33,840,060	86,754,383	18,722,033	27,871,234	18,460,199
Maize products	2,313,768	1,751,220	2,534,228	2,252,446	1,974,107	1,425,955
Oat products	1,875,368	677,984	847,947	2,320,323	1,320,756	1,207,854
Offals of corn and grain, } including rice-meal }	3,768,760	..	..	3,125,662	..	..
Rice, exclusive of rice-meal—						
From British East Indies	1,411,203	2,474,608	3,764,170	1,780,264	4,786,881	3,460,392
From other countries	619,920	478,555	3,098,562	1,251,981	1,397,008	2,952,800
Other kinds of grain & corn	2,003,894	1,047,889	1,125,408	3,075,307	1,192,914	1,020,046
Other kinds of meal and } flour }	53,768	..	..	102,065	..	..
Total value	53,622,928	59,622,379	73,730,971	55,590,434	60,881,499	135,988,717
MEAT:—	Cwt.	Cwt.	Cwt.	£	£	£
Beef, salted	68,761	45,381	30,651	452,215	260,383	164,677
*Beef	6,492,230	9,562,174	11,030,363	30,633,629	45,162,037	41,282,749
*Mutton	4,074,956	6,398,942	6,810,161	17,967,566	26,760,522	28,973,658
Bacon	8,281,198	5,611,630	5,677,786	73,591,919	50,867,469	43,529,441
Hams	1,813,154	324,351	1,127,089	16,989,697	2,971,781	8,215,659
Pork, salted (not bacon or } hams) }	24,074	23,320	30,666	175,588	134,100	110,485
*Pork	136,139	502,179	650,640	899,975	3,719,189	3,645,762
Tinned, canned extracts, } including tongue }	2,768,728	985,376	683,518	22,513,946	7,698,921	4,248,894
All other kinds	1,681,503	271,046	297,086	10,380,905	1,810,909	1,619,116
*Rabbits (dead)	255,723	525,070	233,457	661,141	1,597,704	541,376
Total of dead meat	25,546,806	24,550,271	27,121,357	173,861,571	140,498,105	132,381,817
DAIRY PRODUCTS:—	Cwt.	Cwt.	Cwt.	£	£	£
Butter	1,560,204	1,702,208	3,623,998	19,864,427	24,581,748	42,528,899
Margarine	459,369	897,972	1,046,072	2,229,888	5,514,325	5,222,985
Cheese	2,118,350	2,750,260	2,811,774	15,170,620	20,638,946	17,400,486
Total	4,137,823	5,350,435	8,381,844	37,254,885	50,780,019	65,151,770

TABLE No. 9—Continued.

	Quantities.			Values.		
	1919.	1920.	1921.	1919.	1920.	1921.
POULTRY (alive or dead) . . .	147,567	96,525	146,192	£ 1,527,992	£ 872,852	£ 589,146
GAME (alive or dead) . . .	..	..	..	18,564	156,339	47,671
Eggs . . .	Gt. Hunds. 5,644,395	Gt. Hunds. 7,070,266	Gt. Hunds. 10,538,312	8,613,326	11,569,338	11,393,318
Total value . . .	..	..	..	10,160,278	12,598,529	12,030,135
FRUIT, VEGETABLES, &c.:—	Cwt.	Cwt.	Cwt.	£	£	£
Apples . . .	2,967,227	4,620,329	3,999,973	6,245,874	9,502,177	7,393,067
Cherries . . .	19,121	55,801	111,071	65,654	236,518	407,912
Plums . . .	88,273	813,611	167,259	263,202	1,192,386	615,697
Pears . . .	372,887	663,541	738,123	844,041	2,022,946	1,674,802
Grapes . . .	565,434	593,108	593,477	1,767,835	2,080,467	1,810,876
Oranges . . .	5,200,973	4,401,764	5,855,144	9,445,154	8,017,095	7,948,064
Lemons . . .	655,205	500,495	307,542	1,006,455	708,747	1,017,048
Unenumerated . . .	198,947	343,262	490,606	445,707	738,748	825,243
Onions . . .	Bushels. 6,932,229	Bushels. 7,080,155	Bushels. 8,911,742	3,561,492	3,303,209	2,952,655
Potatoes . . .	Cwt. 988,879	Cwt. 5,210,095	Cwt. 3,060,276	1,547,632	5,174,572	3,084,398
Vegetables, unenumerated (raw) . . .	..	..	..	484,437	732,276	907,006
Hops . . .	154,453	459,561	220,127	2,374,115	8,823,330	3,809,200
Total value . . .	..	..	..	28,051,598	42,582,471	32,445,608
OTHER ARTICLES:—	Tons.	Tons.	Tons.	£	£	£
Lard . . .	108,916	72,345	113,730	18,673,125	12,793,129	10,455,169
Wool, sheep, and lambs . . .	Centals. 10,428,992	Centals. 8,728,799	Centals. 7,610,440	96,888,830	87,623,962	41,539,608
Wood and timber—	Loads.	Loads.	Loads.			
Hewn (pit-props or pit-wood) . . .	1,451,733	2,003,937	1,296,924	7,309,939	9,869,122	3,224,152
Sawn or soft . . .	4,657,997	3,929,524	2,058,408	50,997,071	55,113,611	17,431,207
Staves . . .	84,602	155,671	51,121	1,363,189	3,640,306	1,409,008
Oilseed-cake (not sweetened) . . .	Tons. 273,224	Tons. 227,210	Tons. 325,614	5,820,530	3,649,608	3,606,874
Seeds—	Cwt.	Cwt.	Cwt.			
Clover and grass . . .	287,742	263,920	251,617	1,900,273	2,015,274	1,278,241
Cotton . . .	Tons. 461,598	Tons. 442,842	Tons. 376,622	9,773,600	8,453,765	4,231,475
Flax or linseed . . .	Qrs. 2,764,559	Qrs. 389,367	Qrs. 460,791	20,662,835	15,688,378	8,609,808
Rape . . .	397,363	29,960	28,077	2,707,832	1,090,060	565,700
Soya beans . . .	Tons. 61,565	Tons. 14,978	Tons. 61,425	1,640,639	850,928	901,007
Bones (whether burnt or not) . . .	13,025	16,200	14,735	177,150	239,596	150,249
Guano . . .	101	12,740	8,465	1,250	159,568	114,574
Basic slag . . .	1,697	17,584	44,354	10,640	134,918	247,729
Nitrate of soda (cubic nitre) . . .	Cwt. 439,700	Cwt. 2,949,530	Cwt. 1,116,612	514,525	3,337,543	959,017
Phosphate of lime and rock phosphate . . .	355,758	523,350	369,386	1,342,226	2,655,414	1,577,514
Cotton, raw of 100 lb. . .	Centals. 19,582,367	Centals. 18,972,224	Centals. 11,725,521	190,771,416	258,997,742	72,461,969
Hemp . . .	Tons. 120,986	Tons. 144,464	Tons. 53,366	8,795,934	11,387,160	2,566,329
Flax . . .	11,107	20,788	18,651	2,776,858	7,776,438	3,849,559
Hides untanned—	Cwt.	Cwt.	Cwt.			
Dry . . .	947,985	753,264	296,240	3,030,593	7,138,216	1,823,999
Wet . . .	721,447	483,006	575,031	5,633,867	4,091,719	2,431,909
Petroleum . . .	Gallons. 712,883,737	Gallons. 876,199,000	Gallons. 1,061,466,989	36,079,174	66,317,760	52,317,217

TABLE NO. 10.—QUANTITY AND VALUE OF DEAD MEAT imported into the United Kingdom in the undermentioned Years.

	Quantities.			Values.		
	1919.	1920.	1921.	1919.	1920.	1921.
BACON, from—	Cwt.	Cwt.	Cwt.	£	£	£
Denmark	6,644	704,075	1,849,885	65,803	7,316,370	16,980,004
United States	5,893,514	8,382,264	2,609,379	52,114,884	29,453,894	16,266,868
Canada	2,094,248	1,493,008	844,024	18,880,735	13,128,736	6,217,080
Other countries	286,792	52,288	474,498	2,580,497	468,469	4,115,480
Total	8,281,198	5,611,630	5,677,766	73,591,919	50,367,469	43,520,441
BEEF (salted), from—						
United States	53,768	40,207	28,984	860,668	259,810	150,425
Other countries	14,993	5,074	1,667	91,547	20,578	5,252
Total	68,761	45,281	30,651	452,215	280,388	164,677
*BEEF (fresh and refrigerated)—						
Denmark . . . . .	..	1,150	17,777	..	7,071	117,220
United States	856,165	224,641	149,063	4,715,681	1,124,367	680,643
Uruguay	309,063	801,288	1,210,278	1,431,967	3,658,121	4,426,924
Argentine Republic	3,887,720	6,537,418	7,479,006	18,164,396	30,400,466	27,473,344
Australia	622,318	842,477	1,677,140	2,488,184	5,622,084	5,381,359
New Zealand	424,785	867,879	819,568	1,771,322	8,693,540	2,269,913
Other countries	412,229	587,301	275,731	2,062,079	2,756,438	933,357
Total	6,492,230	9,863,174	11,630,863	30,633,629	45,162,037	41,282,749
HAMS, from—						
United States	1,718,363	283,591	1,020,718	15,264,376	2,598,627	7,472,465
Canada	74,762	25,776	93,006	653,424	237,074	656,483
Other countries	20,029	14,984	12,465	71,307	186,080	86,711
Total	1,813,154	324,351	1,127,089	15,989,697	2,971,781	8,215,659
†TINNED, CANNED EXTRACTS (including Tongue)—						
Beef	2,566,378	761,008	505,893	20,967,431	6,427,654	3,621,249
Mutton	202,350	147,107	52,236	1,551,515	927,941	296,551
Other descriptions . . . . .	..	77,263	75,389	..	338,326	331,094
Total	2,768,728	985,378	633,518	22,518,946	7,693,921	4,248,894
†ALL OTHER KINDS—						
Tinned or Canned	494,201	117,881	68,278	5,232,198	1,537,841	703,865
Salted	15,512	5,219	105,510	..	35,502	73,236
Other descriptions	1,121,880	147,946	209,697	5,543,197	617,586	841,925
Total	1,631,593	271,046	297,036	10,880,905	1,810,900	1,619,116
*MUTTON (fresh and refrigerated)—						
Netherlands . . . . .	..	54,413	70,948	..	407,113	409,020
Uruguay	117,457	31,918	131,586	595,071	138,667	495,014
Argentine Republic	974,848	773,604	1,410,872	4,957,883	3,529,413	5,804,063
Australia	758,579	2,258,084	417,492	3,008,098	9,080,776	1,811,717
New Zealand	1,999,444	3,074,848	3,897,113	8,481,441	12,575,359	16,441,905
Other countries	224,628	205,985	882,140	915,563	1,029,174	4,012,289
Total	4,074,956	6,398,942	6,810,161	17,957,556	26,760,522	28,973,658
PORK (salted, not Bacon or Hams), from—						
Denmark . . . . .	..	4,814	9,839	..	10,926	20,688
United States	23,083	16,505	15,278	168,572	107,410	73,251
Other countries	991	2,501	5,549	7,016	15,854	16,546
Total	24,074	23,320	30,666	175,588	134,190	110,485
*PORK (fresh and refrigerated)—						
Netherlands . . . . .	..	31,276	262,668	..	326,957	1,772,416
Belgium . . . . .	..	..	11,044	..	..	77,582
United States	12,207	154,906	181,609	81,534	1,152,674	740,989
Other countries	123,932	815,997	225,310	* 818,441	2,239,468	1,054,325
Total	136,139	502,179	650,640	899,975	3,719,189	3,645,782
*RABBITS (dead), from—						
Belgium . . . . .	..	1	1,686	..	6	11,341
Australia	218,166	507,015	206,086	553,106	1,581,495	462,312
New Zealand	33,006	13,720	22,846	89,976	37,279	50,272
Other countries	4,561	5,284	2,839	18,059	28,924	17,461
Total	255,733	525,970	238,467	661,141	1,597,704	541,876
Total of dead meat	25,546,606	24,550,271	27,121,357	173,861,571	140,498,105	132,831,817

* In the Official Returns from 1909 the imports are shown separately as "Fresh," "Chilled," and "Frozen."

† Tongues, Hearts, Livers, Kidneys &c. are included in "All other kinds" prior to 1920.

TABLE No. 11.—QUANTITIES AND VALUES OF BUTTER, MARGARINE, CHEESE, AND Eggs imported into the United Kingdom in each Year from 1919 to 1921 inclusive.

[From Trade and Navigation Returns.]

	Quantities.			Values.		
	1919.	1920.	1921.	1919.	1920.	1921.
BUTTER from—	Cwt.	Cwt.	Cwt.	£	£	£
Russia . .	6,954	19,308	...	87,608	280,654	...
Sweden . .	...	4	808	...	44	8,222
Denmark . .	290,291	817,268	1,250,176	3,947,835	11,762,845	15,084,605
Netherlands . .	1,641	102,567	63,065	20,812	1,583,482	744,245
France . .	2	8,734	542	16	120,439	6,574
United States . .	216,495	37,261	1,910	2,746,908	557,152	13,225
Argentine Republic . .	265,675	138,862	401,354	3,344,213	2,038,594	5,017,034
Victoria . .	214,689	129,474	419,757	2,702,671	1,961,743	5,362,175
New S. Wales . .	118,974	74,166	244,689	493,664	999,769	2,953,524
Queensland . .	73,853	19,969	263,560	930,668	270,714	2,975,825
New Zealand . .	318,872	275,406	709,381	3,910,432	3,828,280	8,494,060
Canada . .	33,337	32,140	43,138	417,588	477,250	529,856
Other countries	19,421	47,044	125,618	252,012	637,782	1,339,054
Total .	1,560,204	1,702,203	3,523,998	19,854,427	24,518,748	42,528,399
MARGARINE from—	Cwt.	Cwt.	Cwt.	£	£	£
Netherlands . .	458,148	853,263	1,036,148	2,223,017	5,231,770	5,149,224
France . .	...	2,430	9,346	...	19,115	71,202
Other countries	1,221	42,279	578	6,821	263,440	2,509
Total .	459,369	897,972	1,046,072	2,229,838	5,514,325	5,222,935
CHEESE from—	Cwt.	Cwt.	Cwt.	£	£	£
Netherlands . .	79,217	112,196	128,032	668,289	724,194	768,956
Italy . .	180	951	7,447	3,529	19,222	65,759
United States . .	16,169	73,344	49,263	125,127	518,978	308,863
Australia . .	112,736	63,439	77,731	830,935	515,923	453,902
New Zealand . .	1,239,553	1,260,642	1,302,766	8,455,199	9,279,901	8,728,777
Canada . .	647,212	1,129,758	1,195,661	4,894,738	8,814,530	6,666,844
Other countries	23,183	109,930	50,874	192,803	761,198	407,335
Total .	2,118,250	2,750,260	2,811,774	15,170,620	20,633,946	17,400,436
Eggs from—	Great Hundreds.	Great Hundreds.	Great Hundreds.	£	£	£
Russia . .	...	9,183	...	...	14,420	...
Denmark . .	1,638,067	3,939,437	4,735,275	2,776,116	7,032,357	5,455,373
Germany . .	...	6,960	3,735	...	11,112	3,502
Netherlands . .	620	48,474	505,493	1,180	73,748	573,804
France . .	6,584	15,160	53,546	7,065	24,836	56,793
Italy . .	...	...	...	...	...	...
Austria- } . .	...	7,984	{ 9,114 }	...	14,457	{ 6,125 }
Hungary } . .	...	...	{ 29,368 }	...	...	{ 22,073 }
United States . .	1,408,806	331,185	221,889	2,205,092	553,211	253,278
Egypt . .	758,728	556,740	642,000	930,674	587,450	508,256
Canada . .	1,476,962	807,281	684,480	2,230,422	1,478,933	788,069
Other countries	354,828	1,338,104	3,653,412	462,777	1,778,814	3,726,045
Total .	5,644,395	7,060,508	10,538,312	8,613,326	11,569,338	11,393,818

TABLE NO. 12.—NUMBER OF LIVE STOCK IN 1918, 1919, AND 1920, returned as entering the Markets at the Places scheduled under the Markets and Fairs (Weighing of Cattle) Act, 1891.

[From Agricultural Statistics, 1920.]

	CATTLE.			SHEEP.			PIGS.		
	1918.	1919.	1920.	1918.	1919.	1920.	1918.	1919.	1920.
Aberdeen .	49,475	66,900	88,718	187,464	170,665	216,487	6,311	5,293	10,415
Dundee .	8,545	6,322	9,212	14,855	4,386	7,702	1,088	799	2,672
Edinburgh	40,750	40,806	53,242	165,578	108,411	181,783	1,806	844	5,173
Stirling .	56,077	56,869	64,027	214,276	191,133	223,850	3,144	3,790	5,823
Glasgow .	56,799	47,216	81,962	254,643	81,594	178,774	1,863	1,576	4,869
Perth . .	54,326	67,625	85,655	278,328	344,848	394,279	5,012	6,426	9,717
	265,972	285,238	382,816	1,115,144	896,037	1,152,275	18,724	18,228	38,669

TABLE NO. 13.—AVERAGE PRICES OF FAT CATTLE PER CWT. (LIVE WEIGHT) at the undermentioned Places in each Year from 1913 to 1920, together with the average Prices for Scotland, England, and Great Britain, compiled from the Returns received under the Markets and Fairs (Weighing of Cattle) Act, 1891.

	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Aberdeen . . .	38 4	39 0			72 7	72 5	77 9	96 5
Dundee . . .	37 0	37 9		56 8				95 4
Edinburgh . . .	39 10	40 7	52 4	60 4	77 8	70 8	74 8	96 3
Glasgow . . .	38 9	39 10	52 1	59 8				
Perth . . .	40 7	41 8	54 4	62 1	79 9		81 4	101 7
SCOTLAND . . .	38 11	39 8						
ENGLAND . . .	38 11	39 8						
GREAT BRITAIN .	38 11	39 8						

TABLE NO. 14.—NUMBER AND VALUE OF LIVE CATTLE, SHEEP, AND PIGS imported into the United Kingdom in the undermentioned Years. [*From Trade and Navigation Returns.*]

	Number.			Value.		
	1913.	1920.	1921.	1913.	1920.	1921.
*CATTLE, from—				£	£	£
Channel Islands	2,895	..	..	55,075	..	..
Canada	1,755	..	31,974	36,212	..	1,280,508
United States	10,043	..	34,880	213,025	..	1,510,685
Argentine Republic . . . . .	..	..	..	..	..	..
Other countries . . . . .	..	..	..	..	..	..
Total	14,743	..	66,674	304,312	..	2,756,193
SHEEP AND LAMBS, from—						
Canada	501	..	2,056	751	..	9,505
United States . . . . .	..	..	5,650	..	..	38,729
Argentine Republic . . . . .	..	..	..	..	..	..
Other countries . . . . .	..	..	..	..	..	..
Total	501	..	10,706	751	..	48,234
PIGS (not separately enumerated) }	..	..	..	..	..	..
TOTAL VALUE OF ANIMALS LIVING FOR FOOD }	..	..	..	305,063	..	2,804,427

* Included animals for breeding in 1913.

TABLE NO. 15.—NUMBER OF HORSES, CATTLE, SHEEP, AND PIGS imported into Great Britain from Ireland in each of the Years 1915-1921.

	1915.	1916.	1917.	1918.	1919.	1920.	1921.
*HORSES :—							
Stallions	276	272	357	303	384	376	263
Mares	7,729	2,779	2,062	8,402	8,028	11,494	11,316
Geldings	9,806	3,827	3,183	11,376	13,370	12,849	9,873
Total	17,811	6,878	5,602	20,081	21,782	24,719	21,452
CATTLE: Oxen, Bulls, and Cows :—							
Fat	863,272	423,783	404,787	375,705	531,842	452,481	376,138
Store	440,995	442,745	394,865	289,694	194,781	399,049	318,141
Other cattle	9,459	9,398	62,952	33,961	29,947	47,106	34,010
Calves	27,009	13,180	25,992	20,752	8,681	27,290	39,201
Total	840,735	889,056	888,596	720,112	765,251	925,926	767,490
SHEEP :—							
Sheep	229,896	313,467	415,338	310,337	276,915	243,525	243,651
Lambs	259,495	323,270	347,773	304,036	230,230	331,215	337,610
Total	489,391	636,737	763,111	614,373	507,145	574,740	581,261
PIGS :—							
Fat	171,963	263,989	185,958	165,712	192,540	158,872	62,794
Store	7,093	14,168	13,373	4,597	5,773	7,750	3,056
Total	179,056	278,147	199,331	170,309	198,313	166,622	65,850

* Not including Army Horses.

EDINBURGH CORN-MARKET GRAIN TABLES for WHEAT, BARLEY, OATS, and BEANS, showing the Quantity offered for Sale, the Quantity Sold, the Highest, Lowest, and Average Prices; also the Bushel-weights as fixed by Government, likewise the Results for every Month, and the final Result for the year 1921.

WHEAT.

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Bushel Weights.
1921 Jan.	<p>N.B.—The offering of grain by farmers and others in the area of the market was not resumed during the year 1921, except for the exposure of a few samples of oats at intervals.</p> <p>Now that control is eliminated, it is to be hoped that advantage will be taken of the privilege afforded to farmers and merchants of offering grain in the open market, as undoubtedly it enables them to secure the market value, and gives a desirable indication of the true values of the various grains.</p> <p>The following notes record the year's proceedings.</p>					
Feb.	<p>During January millers were paying from 80s. to 85s. delivered for wheat in condition, but out-of-condition lots were hard to dispose of.</p> <p>With a quiet trade during February, and uncertainty as to what would evolve with the cessation of control, values declined to the extent of 10s. per qr.</p>					
March	<p>On 5th March control ceased, and an arrangement was made whereby the millers had to pay a price fixed by the "Royal Commission on Wheat Supplies" to farmers for home-grown wheat of sound milling quality, but proportionately lower prices to be paid for wheat of inferior quality or condition. The price so fixed was arrived at by an average of 3 months, and for March was given as 95s. per 504 lb. For future reference it may be advisable to quote the official instructions relative to the fixing of the price:—</p>					
April	<p>"The price of 95s. per 504 lb. for home-grown wheat of sound milling quality will continue so long as the average c.i.f. cost of imported wheat remains above the parity of that figure. This average will be the average of the c.i.f. cost of all milling wheat imported during the two preceding months, together with the actual and anticipated arrivals in the United Kingdom during the current month, subject to an adjustment in respect of the lower percentage of flour of equal water content obtainable from home-grown wheat as compared with imported wheat. In the event of this average falling below the equivalent of 95s. the price of home-grown wheat will be adjusted, and the revised price to be paid by millers announced by my Committee."</p>					
May	<p>It is also known that the farmers were requested to send in their claims for all wheat of milling quality sold by them to the millers direct, or to merchants who passed it on to the millers, between the 8th November 1920 and 5th March 1921, so as to enable them to receive payment of the difference between what they sold it at and the fixed price of 95s.</p>					
June	<p>According to arrangement of fixed price, the millers paid 95s. on the 9th of March and again on the 16th March, but on the 23rd they did not go beyond 92s., and on 30th March only 85s. was paid, in each case for fine quality, other standards bringing from 2s. to 5s. less, all delivered.</p>					
July	<p>On the 1st of April the mills were decontrolled, but an arrangement was made whereby the millers up to 13th August 1921 should pay the prices fixed by the "Wheat Commission," they in turn to be paid by the Board of Trade a refund which at first amounted to 25s. per qr. of 504 lb.</p>					
Aug.	<p>Therefore during April millers paid 95s. per 504 lb., and when a farmer delivered by cart at the mill 96s. was paid, but on the last Wednesday of April only 90s. delivered was paid.</p>					
Sept.	<p>The "Commission" price for May was 92s. per qr. of 504 lb., and the refund continued at 25s. per qr. of 504 lb., and the millers paid this figure, allowing the 1s. per qr. extra for wheat carted in.</p>					
	<p>The price for June was reduced, and the refund fell from 25s. to 20s. Millers paid 88s. for best milling up to the last Wednesday in the month, when a drop of 10s. per qr. took place, and this price of 78s. ruled during</p>					

WHEAT—continued.

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Bushel Weights.
1921 Oct.	<p>July for best milling carted in. On the 27th July the millers refrained from buying, as a few days previously the "Commission" fixed the price for August at 80s., this figure to be received by the grower up to 13th August, after which the Government undertaking ceased, and no rebate was granted to millers after 31st July.</p> <p>Under the circumstances nothing was purchased in early August at the "Commission" price, and by the 31st of August old wheat ranged from 60s. to 65s. per qr. delivered.</p>					
Nov.	<p>New wheat offered on the 31st of the month realised from 57s. to 60s. delivered, and was in a soft condition. New wheat seldom admits of its securing a price in excess of old, and in this respect differs from barley and oats.</p> <p>September trade was slow, and during the first fortnight the value dropped 10s., and by the end of the month another 7s. 6d., leaving the price at 45s. to 48s. 6d. delivered.</p>					
Dec.	<p>The downward movement during October reduced the best grade to 46s. delivered.</p> <p>November was rather irregular; opening with a fall of 3s., it recovered 2s., and again receded, closing the month at 42s., delivered, for best milling.</p> <p>December, with a quiet trade, experienced little change, and the year closed at roughly 41s. per qr., delivered, for best quality.</p>					
Result for year	<p>The arrangement made by the Government whereby the farmer received £3 per acre for his 1921 crop should be taken into consideration when reviewing the prices received during the last four months of the year. Probably on average about 10s. per qr. could be added to the prices recorded for these months.</p>					

BARLEY.

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Bushel Weights.
1921 Jan.	<p>From the beginning to the end of the year barley was not a buoyant market. During January the best malting sorts brought about 75s. on rail, but secondary and out-of-condition lots were neglected and difficult to sell.</p>					
Feb.	<p>The break in price which took place early in February was very serious, and best lots of malting, by the end of the month, only brought 45s. per qr. on rail, a fall of 30s. per qr., while secondary grade was a wretched trade, 20s. to 28s. being the range during the last fortnight.</p>					
March	<p>March improved somewhat owing to seed demand, and for good quality 50s. or so was paid. The secondary class, influenced by the better inquiry, enabled sellers to get from 2s. to 3s. advance.</p>					

BARLEY—*continued.*

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Bushel Weights.
1920 April						<p>April was a quiet month, and the best lots slipped back to 45s., but secondary kinds were steady round about 30s. for the better samples.</p>
May						<p>During May and June the market was very dull, and the value of best quality receded to the region of 40s., but strange to say during this period secondary lots held their own, even in spite of dull and somewhat neglected trade, and on average quite 2s. 6d. advance was secured.</p>
June						<p>July brought some heartening, as the value for fine quality rose from 3s. at first to 10s. towards the close—thus the quotation came back to 50s. or thereby on rail, the price quoted for end of March. Secondary class advanced in rather greater proportion, and commanded 45s. for the good lots.</p>
July						<p>August kept steady with virtually no change in either class, but at the end of August "New Crop" was offered and brought from 50s. to 60s. per qr. on rail.</p>
Aug.						<p>September inclined to react, and the value at the close of month was 50s. for best and 40s. for secondary.</p>
Sept.						<p>October was subject to further decline, and finished with fine lots at 42s. 6d. and secondary at 33s. on rail.</p>
Oct.						<p>November improved somewhat, and on average advanced quite 2s. 6d. per qr. for fine lots, while secondary maintained a wonderfully steady market at about 32s., and even more towards the end of the month.</p>
Nov.						<p>December experienced a slow trade, and the values at close of year may be given as 42s. for best malting and 33s. for good secondary on rail.</p>
Dec.						<p>It may be mentioned that occasionally prices are paid in excess of what may be taken as fair values all over. For example, while 50s. was the general price for best malting sorts, 5s. and even more was paid for a few exceptional lots, but these can hardly be considered as indicative of the general value of the grain.</p>
Result for Year						

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Bushel Weights.
1920 Jan.	Throughout January the market was quiet, and starting at 44s. for best milling and 38s. for best feeders, or an average of 42s. and 36s. respectively, the tendency was downwards, for the market had not recovered from the surfeit of poor quality, and at the close of the month 40s. was only secured for best milling and 30s. for feeders, a difference of 4s. and 8s. per qr.					
Feb.	On Wednesday, 9th February, a serious fall in prices took place for all kinds of grain, and milling oats suffered to the extent of nearly 5s. per qr. on average, and feeders 1s. per qr. on average. After this the market kept quiet but wonderfully steady till the middle of March, when a rather better demand for both classes of oats sprang up, and the values gradually rose from the region of 33s. to 41s. for best milling—the price paid at end of April—while best feeders during the same period advanced from say 26s. to 38s.					
March	These advances brought the values back to what they were in early January for feeders, with milling the matter of 1s. 6d. or so less on average.					
April	In early May a slower trade existed and buyers met their requirements at 2s. per qr. reduction. The remainder of the month, as well as June and July, experienced few changes, and a fair overhead value during that period would be 37s. 6d. for milling and 34s. for feeders.					
May	With the advent of August new crop was offered. The colour and condition was decidedly above average, but the grain was small in bulk with a considerable quantity of lights, and gave evidence that it had suffered from want of moisture. The value as compared with old was not so great as is usual, for while round about 45s. was paid at first as against 40s. for best old, the equalisation was so rapid that by the end of the month 1s. per qr. could be quoted as the difference between "New and Old," say, 39s. and 38s.					
June	During September prices gradually fell away, and the decline continued till the end of October, and at that date best milling ranged round 28s., a fall of roughly 9s. per qr., with best feeders bringing 27s. 6d., or a fall of 7s. per qr.					
July	A better demand during November raised the price of milling 1s. 6d. per qr., making it 29s. 6d., but feeders were not affected, continuing to realise round about 27s. 6d. per qr. for good quality. December slackened towards its close, with the result that the November gain was lost; and finished with best milling at 28s. per qr. and feeders correspondingly less.					
Aug.	The enhanced value derived from the Government allowance of £4 per acre falls to be added to the prices quoted above for the last four months of the year.					
Sept.	Strange to say feeding oats maintained a relatively better price than milling during the year, in fact the average value of feeders during April, May, June, July, and August was in excess of the January average.					
Oct.	The year was one of uncertainty as to economic conditions, and though the slump in oat prices was less than in either wheat or barley, the difference between the early January and late December values as quoted was roughly 30 per cent for milling oats, and fully 15 per cent for feeders.					
Nov.	The average of the monthly values throughout the year indicate about 18 per cent for milling and 6 per cent for feeders less than the average prices for January, but if the enhanced value is taken into account for the 1921 crop marketed during the last four months of the year, the percentages over the year would be altered, working out at roughly 9 per cent less for milling quality, and 5 per cent more for feeders than the averages for both classes in January.					
Dec.						
Result for year						

BEANS.

There is a comparatively small trade in local beans, in fact a large proportion of the beans sold are of English growth. In January they realised 85s. or so, but by the end of April the price had fallen to the region of 60s., and gradually receded till the quotation was 37s. to 40s. in August, and were somewhat slack afterwards.

PRICES OF SHEEP SINCE 1818.

TABLE No. 1.—CHEVIOT SHEEP.

Year.	Wethers.		Ewes.		Lambs.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1818	28 0	to 30 0	not quoted.		8 0	to 10 0
1819	25 0	" 27 0	15 0	to 17 0	10 6	" 12 0
1820	20 0	" 25 0	16 0	" 17 0	10 0	" 11 0
1821	18 0	" 20 0	14 0	" 16 0	7 6	" 8 0
1822	12 6	" 18 0	8 0	" 8 6	4 6	" 0 0
1823	13 6	" 18 0	7 0	" 10 6	5 6	" 6 0
1824	14 0	" 19 0	7 0	" 9 0	4 6	" 6 0
1825	29 0	" 32 0	15 0	" 19 0	9 0	" 10 6
1826	17 6	" 21 6	13 0	" 15 0	7 0	" 7 6
1827	15 0	" 24 0	not quoted.		7 0	" 8 0
1828	18 0	" 27 6	12 0	to 15 0	7 0	" 8 3
1829	18 0	" 24 0	12 6	" 14 0	7 0	" 8 6
1830	15 0	" 21 0	8 0	" 11 0	6 0	" 6 9
1831	18 0	" 25 0	9 0	" 18 0	7 0	" 8 0
1832	19 0	" 24 0	11 0	" 16 0	7 0	" 9 0
1833	22 0	" 31 0	13 6	" 20 0	8 0	" 11 3
1834	22 0	" 31 0	13 6	" 21 0	9 0	" 11 6
1835	22 0	" 27 6	18 0	" 20 6	8 0	" 11 0
1836	24 0	" 31 6	16 0	" 19 0	10 0	" 14 0
1837	19 0	" 28 0	14 0	" 19 0	10 0	" 13 0
1838	28 0	" 30 6	17 0	" 22 0	12 0	" 14 0
1839	28 0	" 31 0	14 0	" 19 0	0 0	" 18 0
1840	24 0	" 33 0	15 0	" 28 0	7 0	" 11 6
1841	28 0	" 30 0	14 0	" 22 0	8 0	" 12 0
1842	22 6	" 28 0	13 0	" 17 0	7 6	" 10 0
1843	19 0	" 25 0	8 0	" 12 0	6 0	" 8 0
1844	21 0	" 29 0	10 0	" 16 0	8 0	" 10 6
1845	28 0	" 33 0	13 0	" 20 0	8 0	" 13 0
1846	24 0	" 33 6	14 6	" 21 6	10 0	" 14 6
1847	24 0	" 35 0	18 0	" 24 0	11 6	" 15 0
1848	28 0	" 34 6	13 0	" 28 0	11 6	" 15 0
1849	21 0	" 30 2	12 0	" 21 0	0 0	" 14 0
1850	20 6	" 29 6	12 0	" 20 0	8 0	" 13 0
1851	21 6	" 31 0	13 0	" 21 0	8 9	" 14 0
1852	21 0	" 32 0	15 0	" 23 0	9 0	" 14 0
1853	26 6	" 38 0	17 0	" 28 6	9 0	" 17 0
1854	25 0	" 36 0	17 0	" 26 0	9 0	" 16 6
1855	23 6	" 36 0	16 0	" 25 0	10 0	" 17 0
1856	22 0	" 35 6	15 6	" 24 0	10 0	" 15 0
1857	24 0	" 36 0	14 6	" 26 0	10 6	" 14 6
1858	24 0	" 34 6	14 0	" 24 6	10 6	" 14 0
1859	25 0	" 34 6	16 0	" 25 0	10 3	" 14 9
1860	26 0	" 38 0	17 6	" 27 6	12 6	" 17 6
1861	25 0	" 38 6	16 0	" 28 0	9 0	" 16 0
1862	27 0	" 37 6	17 6	" 28 0	10 0	" 16 0
1863	25 0	" 38 6	19 0	" 28 6	10 6	" 16 0
1864	31 0	" 41 0	21 0	" 31 6	14 0	" 18 0
1865	32 6	" 44 0	22 6	" 33 6	14 6	" 20 0
1866	37 0	" 50 0	29 0	" 42 6	15 0	" 26 0
1867	26 0	" 58 0	18 0	" 35 6	12 0	" 16 0
1868	30 0	" 32 0	15 6	" 31 0	7 6	" 13 0
1869	28 0	" 38 0	15 0	" 22 6	7 6	" 14 0
1870	35 6	" 43 0	18 0	" 28 0	10 0	" 17 0
1871	36 6	" 49 0	22 0	" 33 6	14 0	" 20 0
1872	45 0	" 56 0	32 0	" 42 0	16 0	" 22 0
1873	42 0	" 51 0	25 0	" 42 0	15 6	" 22 0
1874	33 6	" 44 6	21 0	" 36 0	12 0	" 17 0
1875	33 0	" 48 6	21 0	" 34 0	13 6	" 23 6
1876	40 0	" 52 6	23 0	" 30 0	13 6	" 25 0
1877	41 0	" 51 0	25 0	" 37 0	15 0	" 24 0
1878	35 6	" 48 0	23 6	" 35 0	14 0	" 22 0
1879	34 0	" 44 0	21 0	" 34 0	14 0	" 20 0
1880	30 0	" 43 6	30 0	" 30 0	12 6	" 20 0
1881	32 0	" 45 6	29 0	" 34 0	14 0	" 20 0
1882	40 0	" 51 0	30 0	" 40 0	14 0	" 20 6
1883	44 0	" 55 6	34 6	" 46 6	15 6	" 23 0
1884	36 0	" 47 6	29 6	" 41 6	12 6	" 20 0
1885	30 0	" 38 0	24 0	" 31 0	12 0	" 18 0
1886	32 0	" 40 0	21 0	" 39 0	12 6	" 19 0
1887	29 0	" 36 0	18 0	" 26 0	11 0	" 16 6
1888	30 0	" 38 0	19 0	" 27 0	12 0	" 17 6

TABLE No. 1.—CHEVIOT SHEEP—Continued.

Year.	Wethers.		Ewes.		Lambs.	
	s.	d.	s.	d.	s.	d.
1889	36	0 to 44	24	0 to 32	14	0 to 22
1890	31	0 " 40	22	0 " 30	12	0 " 20
1891	27	0 " 38	16	0 " 25	9	0 " 16
1892	22	0 " 30	13	0 " 22	5	0 " 11
1893	26	0 " 35	18	0 " 28	8	0 " 15
1894	26	0 " 37	20	0 " 31	10	0 " 18
1895	28	0 " 39	22	0 " 34	11	0 " 19
1896	24	0 " 34	19	0 " 30	9	0 " 16
1897	27	0 " 36	21	0 " 31	11	0 " 17
1898	27	0 " 37	22	0 " 32	12	0 " 18
1899	24	0 " 33	20	0 " 30	10	0 " 16
1900	26	0 " 36	22	0 " 32	12	0 " 17
1901	25	0 " 32	20	0 " 29	11	0 " 16
1902	24	0 " 31	18	0 " 27	9	0 " 14
1903	26	0 " 34	21	0 " 31	11	0 " 18
1904	28	0 " 36	23	0 " 32	13	0 " 20
1905	27	0 " 35	23	0 " 33	14	0 " 21
1906	30	0 " 38	26	0 " 34	15	0 " 23
1907	28	0 " 34	22	0 " 30	13	0 " 19
1908	26	0 " 32	21	0 " 27	11	0 " 17
1909	24	0 " 31	18	0 " 25	9	0 " 16
1910	27	0 " 35	22	0 " 31	12	0 " 20
1911	24	0 " 31	18	0 " 27	10	0 " 18
1912	26	0 " 34	22	0 " 31	13	0 " 21
1913	30	0 " 39	24	0 " 35	16	0 " 24
1914	32	0 " 41	28	0 " 39	18	0 " 27
1915	36	0 " 46	31	0 " 44	20	0 " 30
1916	40	0 " 51	34	0 " 49	22	0 " 34
1917	48	0 " 56	38	0 " 50	24	0 " 34
1918	50	0 " 66	42	0 " 61	25	0 " 37
1919	53	0 " 69	44	0 " 67	28	0 " 40
1920	56	0 " 91	48	0 " 79	34	0 " 49
1921	45	0 " 60	52	3 " 85	33	0 " 52

TABLE No. 2.—BLACKFACE SHEEP.

Year.	Wethers.		Ewes.		Lambs.	
	s.	d.	s.	d.	s.	d.
1819	22	0 to 24	12	0 to 15	8	0 to 9
1820	20	0 " 23	15	0 " 17	7	0 " 8
1821	18	0 " 20	12	0 " 13	6	0 " 7
1822	11	0 " 13	5	0 " 6	4	0 " 0
1823	12	0 " 16	5	0 " 6	4	0 " 5
1824	9	0 " 13	6	0 " 7	4	0 " 5
1825	22	0 " 26	11	0 " 13	6	0 " 9
1826	15	0 " 17	8	0 " 9	4	0 " 6
1827	14	0 " 18	7	0 " 10	6	0 " 7
1828	15	0 " 20	8	0 " 11	5	0 " 7
1829	14	0 " 18	9	0 " 10	6	0 " 7
1830	9	0 " 13	4	0 " 6	4	0 " 6
1831	13	0 " 17	5	0 " 7	5	0 " 6
1832	14	0 " 18	7	0 " 11	6	0 " 7
1833	16	0 " 24	7	0 " 12	6	0 " 9
1834	16	0 " 22	10	0 " 13	6	0 " 8
1835	15	0 " 18	10	0 " 13	7	0 " 8
1836	15	0 " 21	9	0 " 12	8	0 " 11
1837	13	0 " 16	8	0 " 12	8	0 " 9
1838	15	0 " 20	10	0 " 13	not quoted.	
1839	15	0 " 22	10	0 " 12	7	0 to 8
1840	15	0 " 22	11	0 " 12	7	0 " 9
1841	16	0 " 20	9	0 " 11	6	0 " 8
1842	14	0 " 19	7	0 " 8	5	0 " 7
1843	not quoted.		4	0 " 6	not quoted.	
1844	15	0 to 21	6	0 " 10	5	0 to 8
1845	14	0 " 23	8	0 " 12	6	0 " 8
1846	13	0 " 24	10	0 " 13	8	0 " 9
1847	20	0 " 25	10	0 " 14	8	0 " 9
1848	20	0 " 24	11	0 " 12	8	0 " 10
1849	not quoted.		not quoted.		7	0 " 7
1850					7	0 " 0
1851	17	0 to 23	9	0 to 12	6	0 " 8
1852	18	0 " 22	9	0 " 12	4	0 " 7
1853	23	0 " 27	14	0 " 16	8	0 " 11
1854	20	0 " 26	11	0 " 16	8	0 " 10
1855	23	0 " 26	14	0 " 16	10	0 " 11
1856	17	0 " 24	10	0 " 20	7	0 " 10
1857	20	0 " 29	10	0 " 25	9	0 " 11
1858	20	0 " 27	9	0 " 18	8	0 " 10
1859	20	0 " 25	10	0 " 24	8	0 " 11
1860	21	0 " 27	11	0 " 16	10	0 " 13
1861	21	0 " 29	12	0 " 22	6	0 " 14
1862	16	0 " 27	12	0 " 18	6	0 " 12

TABLE NO. 2.—BLACKFACE SHEEP—Continued.

Year.	Wethers.		Ewes.		Lambs.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1863	20 0 to	20 6	12 0 to	16 0	8 0 to	11 6
1864	25 0 "	30 0	15 0 "	19 0	10 0 "	13 6
1865	15 6 "	32 6	15 0 "	35 0	10 0 "	17 0
1866	31 6 "	40 0	20 0 "	36 0	13 6 "	22 6
1867	20 0 "	30 6	14 0 "	22 0	7 6 "	18 6
1868	20 0 "	28 9	10 6 "	18 6	7 0 "	18 0
1869	22 0 "	28 0	11 0 "	14 0	6 9 "	9 0
1870	27 0 "	32 6	18 0 "	22 0	8 0 "	14 6
1871	23 0 "	37 0	18 0 "	23 0	11 0 "	16 3
1872	31 6 "	45 0	18 0 "	32 0	12 6 "	18 0
1873	28 0 "	39 0	16 6 "	27 0	7 0 "	16 0
1874	25 0 "	35 0	18 0 "	20 0	7 0 "	14 0
1875	26 6 "	37 6	15 0 "	21 3	9 6 "	17 6
1876	30 0 "	40 0	19 0 "	24 0	13 0 "	20 6
1877	35 0 "	38 9	18 0 "	25 0	13 6 "	23 0
1878	30 0 "	36 0	17 0 "	23 0	12 0 "	22 0
1879	25 0 "	35 9	16 0 "	24 0	10 6 "	20 0
1880	25 0 "	38 0	16 6 "	22 6	10 0 "	17 0
1881	30 0 "	39 0	15 0 "	23 0	10 0 "	15 0
1882	33 0 "	46 0	20 0 "	28 9	12 6 "	18 6
1883	36 0 "	50 6	24 6 "	33 0	14 0 "	21 6
1884	39 0 "	45 6	19 6 "	28 0	12 0 "	19 6
1885	24 6 "	34 0	18 0 "	22 6	10 0 "	16 0
1886	25 6 "	34 0	12 0 "	22 0	10 6 "	16 0
1887	22 0 "	30 0	11 0 "	19 0	8 0 "	13 0
1888	22 0 "	32 0	13 0 "	24 0	10 0 "	15 0
1889	26 0 "	40 9	18 0 "	30 0	13 0 "	22 0
1890	24 0 "	37 0	14 0 "	27 0	10 6 "	19 0
1891	21 0 "	37 0	10 0 "	24 0	7 6 "	15 0
1892	16 0 "	28 6	6 0 "	17 0	3 0 "	10 0
1893	21 0 "	37 0	12 0 "	24 0	7 0 "	14 6
1894	20 0 "	37 6	14 6 "	26 6	8 6 "	16 0
1895	23 0 "	41 0	16 0 "	28 6	9 0 "	17 0
1896	19 0 "	35 4	13 0 "	24 0	6 0 "	13 6
1897	21 0 "	36 6	15 0 "	25 6	7 0 "	14 6
1898	22 0 "	37 0	16 0 "	26 6	8 0 "	15 0
1899	20 0 "	33 6	13 0 "	24 0	5 6 "	13 0
1900	23 0 "	36 0	16 0 "	26 6	8 0 "	15 6
1901	20 0 "	35 0	14 0 "	25 6	6 6 "	14 6
1902	18 6 "	34 0	12 0 "	24 0	6 0 "	14 0
1903	21 0 "	36 0	15 0 "	28 0	7 0 "	16 6
1904	23 0 "	38 6	18 0 "	30 0	8 6 "	17 6
1905	21 6 "	37 0	19 0 "	31 0	9 0 "	18 6
1906	23 0 "	38 0	20 0 "	33 0	10 0 "	19 6
1907	21 0 "	33 6	17 0 "	28 0	8 6 "	17 6
1908	19 6 "	30 0	15 0 "	24 6	8 0 "	16 0
1909	17 0 "	28 0	11 6 "	22 0	6 3 "	13 0
1910	21 0 "	32 6	16 0 "	27 6	8 0 "	17 0
1911	19 0 "	29 6	14 0 "	24 0	7 0 "	15 0
1912	21 6 "	32 6	17 0 "	27 6	9 6 "	17 6
1913	24 6 "	36 0	21 0 "	31 0	12 6 "	21 6
1914	27 0 "	38 6	26 0 "	34 6	15 6 "	24 0
1915	31 0 "	42 6	29 0 "	39 6	17 0 "	25 6
1916	33 0 "	46 6	31 0 "	42 0	19 0 "	27 6
1917	36 0 "	51 0	33 0 "	47 0	21 0 "	30 0
1918	41 0 "	56 0	36 0 "	50 0	27 0 "	33 0
1919	44 0 "	62 0	39 0 "	54 0	29 0 "	36 0
1920	46 0 "	66 0	44 0 "	62 0	31 0 "	43 0
1921	32 0 "	60 9	35 3 "	62 6	20 3 "	47 0

TABLE NO. 3.—PRICE OF WOOL, PER STONE OF 24 LB., SINCE 1818.

Year.	Laid Cheviot.		White Cheviot.		Laid Highland.		White Highland.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1818	40 0 to	42 2	..	..	20 0 to	22 6	..	..
1819	21 0 "	22 0	..	..	10 0 "	10 3	..	..
1820	20 0 "	22 0	..	..	9 0 "	10 0	..	..
1821	18 0 "	20 0	..	..	9 0 "	10 0	..	..
1822	12 6 "	14 6	..	..	5 0 "	6 6	..	..
1823	9 0 "	10 6	..	..	5 0 "	5 9	..	..
1824	13 6 "	15 0	..	..	6 0 "	6 3	..	..
1825	10 6 "	22 0	..	..	10 0 "	10 6	..	..
1826	11 0 "	14 0	..	..	5 0 "	5 6	..	..
1827	11 0 "	14 0	..	..	5 6 "	6 9	..	..
1828	8 0 "	11 0	..	..	4 3 "	0 0	..	..
1829	8 6 "	11 0	..	..	4 6 "	5 0	..	..
1830	9 6 "	11 0	..	..	4 6 "	5 0	..	..
1831	17 0 "	16 0	..	..	7 6 "	8 6	..	..
1832	14 0 "	16 0	..	..	7 0 "	7 6	..	..
1833	18 0 "	20 7	..	..	10 0 "	11 0	..	..
1834	21 0 "	24 6	..	..	5 6 "	7 0	..	..
1835	19 0 "	20 6	..	..	9 6 "	10 3	..	..
1836	21 0 "	25 0	..	..	10 0 "	14 0	..	..
1837	12 0 "	14 0	..	..	7 0 "	7 8	..	..

TABLE No. 3.—PRICE OF WOOL—Continued.

Year.	Laid Cheviot.		White Cheviot.		Laid Highland.		White Highland.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1838	19 0	to 22 6	..	..	6 0	to 10 0	..	..
1839	18 0	" 20 0	..	..	8 0	" 12 0	..	..
1840	15 0	" 0 0	..	..	7 0	" 0 0	..	..
1841	15 0	" 16 9	..	..	6 0	" 7 5	..	..
1842	12 6	" 14 0	..	..	not quoted.	..	..	..
1843	9 0	" 11 6	..	..	5 0	to 6 0	..	..
1844	15 0	" 18 0	..	..	not quoted.	..	..	..
1845	14 6	" 17 6	..	..	7 6	to 8 6	..	..
1846	12 0	" 14 6	..	..	8 0	" 8 6	..	..
1847	12 6	" 14 0	..	..	not quoted.	..	..	..
1848	9 6	" 11 0	..	..	4 9	to 0 0	..	..
1849	12 0	" 16 6	..	..	6 0	" 6 8	..	..
1850	15 0	" 17 6	..	..	8 0	" 8 6	..	..
1851	12 0	" 16 0	..	..	8 0	" 9 8	..	..
1852	13 0	" 15 0	..	..	8 0	" 9 0	..	..
1853	19 0	" 22 0	..	..	11 0	" 12 6	..	..
1854	12 0	" 15 0	..	..	7 6	" 8 6	..	..
1855	14 6	" 19 0	..	..	8 6	" 9 0	..	..
1856	19 0	" 21 6	..	..	11 0	" 0 0	..	..
1857	19 0	" 24 0	..	..	18 0	" 14 8	..	..
1858	15 0	" 17 0	..	..	8 9	" 10 0	..	..
1859	18 6	" 24 0	..	..	10 9	" 11 6	..	..
1860	22 0	" 32 0	87 0	to 38 0	0	" 11 8	..	..
1861	19 6	" 27 0	from 80s. upwards	..	not quoted.	..	..	..
1862	18 6	" 26 0	80 0	to 37 0	11 6	to 16 0	..	..
1863	25 6	" 31 0	88 0	" 42 0	15 8	" 17 6	..	..
1864	81 0	" 89 0	47 0	" 54 0	17 6	" 20 0	..	..
1865	28 0	" 30 0	44 0	" 45 0	15 0	" 17 0	..	..
1866	24 0	" 30 0	80 0	" 88 0	14 0	" 16 0	..	..
1867	16 0	" 21 6	not quoted.	..	not quoted.	..	..	..
1868	19 0	" 26 0	28 0	to 32 0	8 6	to 9 0	..	..
1869	18 0	" 26 6	not quoted.	..	8 6	" 10 0	..	..
1870	16 0	" 23 6	25 0	to 26 0	9 6	" 0 0	..	..
1871	20 0	" 26 6	80 0	" 84 6	12 0	" 15 0	..	..
1872	26 0	" 37 6	40 0	" 48 0	18 0	" 21 0	..	..
1873	17 0	" 18 0	34 0	" 40 0	9 0	" 12 0	..	..
1874	18 6	" 26 6	30 0	" 34 0	9 6	" 13 0	..	..
1875	25 0	" 32 0	34 6	" 36 0	12 6	" 16 0	..	..
1876	30 0	" 24 0	30 0	" 34 6	9 6	" 12 0	..	..
1877	20 9	" 28 0	28 0	" 30 0	10 0	" 12 0	..	..
1878	18 9	" 25 0	27 0	" 32 0	8 6	" 11 6	..	..
1879	15 0	" 17 0	prices very low.	..	7 0	" 0 0	..	..
1880	20 0	" 24 0	80 0	to 32 0	10 6	" 11 6	14 0	to 15 0
1881	17 0	" 21 0	27 0	" 30 0	5 0	" 9 6	12 0	" 13 0
1882	14 0	" 18 0	27 6	" 28 0	7 6	" 9 0	18 0	" 14 0
1883	13 0	" 18 0	26 0	" 28 0	6 6	" 8 6	11 6	" 12 6
1884	13 0	" 18 0	25 6	" 26 0	6 6	" 8 0	11 6	" 12 0
1885	12 0	" 17 0	22 6	" 27 6	6 6	" 8 6	11 6	" 12 0
1886	13 0	" 18 6	25 0	" 28 0	7 0	" 9 0	11 6	" 13 0
1887	14 0	" 22 0	25 0	" 28 0	7 0	" 9 0	11 0	" 12 6
1888	13 0	" 20 0	24 0	" 28 0	7 0	" 9 0	11 0	" 12 6
1889	13 0	" 18 0	24 0	" 28 0	7 0	" 9 0	11 0	" 12 6
1890	13 0	" 18 0	22 0	" 28 0	7 0	" 9 0	11 0	" 12 6
1891	12 6	" 18 0	20 6	" 28 0	7 0	" 8 6	10 6	" 12 0
1892	12 0	" 18 0	20 0	" 27 0	7 0	" 8 0	10 0	" 12 0
1893	12 0	" 17 0	20 0	" 26 0	7 0	" 8 0	10 0	" 12 0
1894	12 0	" 16 0	20 0	" 25 0	7 0	" 8 0	10 0	" 11 6
1895	12 0	" 16 0	19 0	" 24 9	7 0	" 8 0	10 0	" 11 6
1896	11 0	" 15 0	18 0	" 23 6	7 0	" 8 0	10 6	" 12 0
1897	11 0	" 14 0	16 0	" 20 0	7 0	" 8 0	10 0	" 11 6
1898	10 0	" 13 0	13 0	" 18 6	7 0	" 8 0	8 6	" 9 6
1899	10 0	" 13 0	13 0	" 18 6	6 9	" 7 9	8 0	" 9 6
1900	9 9	" 12 0	11 0	" 16 6	5 9	" 6 6	8 0	" 9 0
1901	9 0	" 10 0	11 6	" 17 0	6 0	" 6 6	8 6	" 9 6
1902	9 0	" 10 0	15 0	" 18 0	7 0	" 8 0	11 6	" 12 6
1903	10 0	" 12 0	20 0	" 21 0	9 0	" 10 0	14 0	" 15 0
1904	15 0	" 17 0	24 0	" 26 0	10 0	" 11 0	15 0	" 16 0
1905	17 0	" 20 0	27 0	" 28 6	11 6	" 13 0	16 6	" 17 6
1906	18 0	" 21 0	22 0	" 24 0	11 0	" 12 6	16 0	" 17 0
1907	*	*	16 0	" 18 0	†	†	8 0	" 8 6
1908	*	*	24 0	" 26 0	†	†	12 6	" 14 0
1909	*	*	25 0	" 30 0	†	†	13 0	" 14 6
1910	*	*	25 0	" 30 0	†	†	13 0	" 14 6
1911	*	*	24 0	" 29 0	†	†	14 0	" 15 0
1912	*	*	25 0	" 30 0	†	†	17 0	" 18 0
1913	*	*	24 0	" 29 0	†	†	15 0	" 15 6
1914	*	*	42 0	" 46 0	†	†	21 0	" 22 0
1915 †	*	*						

* No Cheviots smeared now.

† No Highlands smeared now.

‡ These are July prices.

PRICE OF WOOL PER STONE OF 24 LB.—Continued.

		CHEVIOT.				HALF-BRED.				BLACK-FACE.		CROSS-BRED (BLACKFACE EWE AND LEICESTER RAM).				
		Hogg.		EWE AND WETHER.		Hogg.		EWE AND WETHER.		Hogg.	EWE AND WETHER.	Hogg.		EWE AND WETHER.		
		Washed.	Un- washed.	Washed.	Un- washed.	Washed.	Un- washed.	Washed.	Un- washed.			Washed.	Un- washed.	Washed.	Un- washed.	
1 1916	{ CAITHNESS & SUTH- ERLAND }	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
		36 6	30 0	33 0	27 6	34 6	28 6	33 0	27 6	}	23 0	23 0	23 6	25 6	28 6	25 6
1 1917	{ CAITHNESS & SUTH- ERLAND }	40 0	32 6	34 0	29 0	35 0	29 0	34 0	28 6								}	25 6	25 6	31 6	28 6	31 6
		44 6	36 0	37 6	32 6	39 0	32 6	37 6	31 6	}	27 0	27 0	33 6	30 6	33 6	30 6
1 1918	{ CAITHNESS & SUTH- ERLAND }	43 6	35 6	39 6	33 0	41 0	33 6	39 6	33 0								}	34 0	34 0	46 0	39 0	44 0	38 0
		47 6	38 6	40 0	34 6	41 6	34 6	40 0	33 6	}	24 0	24 0	35 0	29 0	34 0	27 0
1919	{ CAITHNESS & SUTH- ERLAND }	84 0	70 0	82 0	66 0	82 0	62 0	70 0	58 0								}	9 6	9 6	12 0	10 0	12 0	10 0
		88 0	74 0	84 0	68 0	84 0	68 0	72 0	60 0	}	23 0	23 0	23 6	25 6	28 6	25 6
1920	{ CAITHNESS & SUTH- ERLAND }	86 0	70 0	83 0	66 0	74 0	54 0	65 0	50 0								}	24 0	24 0	35 0	29 0	34 0	27 0
		90 0	74 0	87 0	68 0	76 0	56 0	68 0	52 0	}	9 6	9 6	12 0	10 0	12 0	10 0
1921	{ CAITHNESS & SUTH- ERLAND }	22 0	17 0	19 0	15 0	18 6	14 6	16 0	13 0								}	9 6	9 6	12 0	10 0	12 0	10 0
		23 0	18 0	20 0	16 0	19 6	15 6	17 0	14 0	}	9 6	9 6	12 0	10 0	12 0	10 0

¹ The prices given were prices fixed by Government, and not free market prices.

GENERAL SHOW AT STIRLING, 1921.

THE Ninetieth Show of the Society was held at Stirling on Tuesday, 26th July, and three following days. This constituted the eighth Highland Show at Stirling, former Shows having been held there in 1833, 1864, 1873, 1881, 1891, 1900, and 1909. As on former occasions, the Show was held in the King's Park, an excellent and convenient site. The Show-yard on this occasion extended to nearly twenty-eight acres, some additional space having been enclosed on the rising ground to the south-west, but even then it was found to be rather small for the large display of live stock and implements.

The weather on the Tuesday and Wednesday was fine, and the attendance of the public on these days was exceptionally large, surpassing the attendance on the corresponding days at Aberdeen in the previous year. On Thursday the weather broke, and on that day and Friday there was almost continuous rain. This adversely affected the numbers admitted on these days; otherwise there was every prospect of a phenomenal attendance. The drawings at the gates and grand stand reached a total of £12,764, this being almost three times the amount drawn at Stirling in 1909. The accounts show a credit balance of £2325. In addition to a donation of £100 and a free supply of water, the town of Stirling compensated the tenant for loss of crop on part of the ground which had been placed under cultivation during the war.

There was a very large entry of stock, all sections, with the exception of horses, showing a substantial increase as compared with the Show of the previous year and the preceding Show at Stirling. The quality of the animals exhibited reached a remarkably high standard. There was also a large and comprehensive display of machinery and implements.

STATISTICS.

The following tables give the number of entries in the various sections:—

1. CATTLE.

Class.	SHORTHORN.						No. of Entries.
1. Aged bulls	6
2. Two-year-old bulls	12
3. One-year-old bulls	24
4. Cows of any age	12
5. Two-year-old heifers	10
6. One-year-old heifers	30

ABERDEEN-ANGUS.

7. Aged bulls	6
8. Two-year-old bulls	12
9. One-year-old bulls	5
10. Cows of any age	3
11. Two-year-old heifers	16
12. One-year-old heifers	17
	— 59

GALLOWAY.

13. Aged bulls	4
14. Two-year-old bulls	3
15. One-year-old bulls	5
16. Cows of any age	10
17. Two-year-old heifers	9
18. One-year-old heifers	11
	— 42

HIGHLAND.

19. Aged bulls	2
20. Two-year-old bulls	4
21. One-year-old bulls	12
22. Cows of any age	9
23. Three-year-old heifers	15
24. Two-year-old heifers	10
	— 52

AYRSHIRE.

25. Cows in milk, calved before 1918	9
26. Cows in milk, calved after 1st January 1918	3
27. Cows of any age, in calf, or Heifer, calved in 1918, in calf, and due to calve within nine months after the Show	13
28. Two-year-old heifers	11
29. One-year-old heifers	11
30. Aged bulls	7
31. Two-year-old bulls	3
32. One-year-old bulls	7
	— 64

MILK RECORD CLASS.

33. Bulls, any age, the progeny of an Ayrshire cow having an authenticated milk-yield (8)
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BRITISH FRIESIAN.

34. Bulls calved in or before 1918	7
35. Heifers calved in 1919	2
36. Bull calved in 1920	4
37. Cows in milk, calved in or before 1917	10
38. Heifers in milk, calved in 1918 or 1919	5
39. Heifers in calf with first calf, to calve before three years old	15
40. Heifers calved in 1920	13
	— 56
	367

2. HORSES.

DRAUGHT STALLIONS.

41. Aged stallions	6
42. Three-year-old entire colts	15
43. Two-year-old entire colts	20
44. One-year-old entire colts	15
	— 56

DRAUGHT GELDINGS.

45. Aged geldings	8
46. Three-year-old geldings	10
47. Two-year-old geldings	11
	— 29

DRAUGHT MARES AND FILLIES.

48. Mares with foal at foot	6
49. Yield mares, foaled before 1918	8
50. Three-year-old yield mares, or fillies	16
51. Two-year-old fillies	19
52. One-year-old fillies	23
	— 72

HUNTERS.

53. Hunter brood mare, with foal at foot	1
54. Yield mares, fillies, or geldings, for field, foaled in 1918, in hand	4
55. Yield mares, fillies, or geldings, for field, foaled in 1919, in hand	5
56. Colts, geldings, or fillies, foaled in 1920, the produce of thoroughbred stallions or registered hunter sires, out of mares of any breed	3
	— 13

HACKNEYS.

57. Brood mares, over 14 hands, with foal at foot or to foal this season to a registered sire	3
58. Yield mares or fillies, three years old	2
59. Entire colt or filly, foaled in 1919	1
60. Entire colts or fillies, foaled in 1920	3
61. Stallion foaled in or before 1918, over 14 hands	1
	— 10

PONIES.

62. Stallion, three years old and upwards, 14 hands and under	1
63. Yield mares, fillies, or geldings, three years old and upwards, over 13 and not over 14 hands, in saddle	6
64. Yield mare, filly, or gelding, three years old and upwards, not over 13 hands, in saddle	1
	— 8

HIGHLAND PONIES.

65. Stallions, three years old or upwards, not exceeding 14·2 hands	3
Extra Stock	1
66. Mares, three years old or upwards, not exceeding 14·2 hands, yield or with foal at foot	13
Extra stock	1
67. Entire colts, foaled after 1st January 1919	3
68. Fillies foaled after 1st January 1919	6
	— 27

WESTERN ISLAND PONIES.

69. Stallions, three years old or upwards, not exceeding 14·2 hands	2
70. Mares, three years old or upwards, not exceeding 14·2 hands, yield or with foal at foot	8
71. Entire colts, foaled after 1st January 1919	3
72. Fillies, foaled after 1st January 1919	2
	— 15

SHETLAND PONIES.

73. Stallions, not exceeding 10½ hands, foaled before 1918	6
Extra Stock	1
74. Entire colts, not exceeding 10½ hands, foaled in 1918 or 1919	4
75. Mares, not exceeding 10½ hands, with foal at foot	12
76. Yield mares, not exceeding 10½ hands	4
77. Fillies, not exceeding 10½ hands, foaled in 1917 or 1918	5
	— 32

HORSES IN HARNESS.

NOVICE CLASSES.

78. Ponies, mares or geldings, any age, in harness, not exceeding 14 hands, to be driven in the ring (4)	2
79. Mares or geldings, any age, in harness, over 14 and not exceeding 15 hands, to be driven in the ring (7)	6
80. Mares or geldings, any age, in harness, over 15 hands, to be driven in the ring	7

OPEN CLASSES.

81. Ponies, mares or geldings, any age, in harness, not exceeding 14 hands, to be driven in the ring (5)	...
82. Mares or geldings, any age, in harness, over 14 and not exceeding 15 hands, to be driven in the ring (6)	1
83. Mares or geldings, any age, in harness, over 15 hands, to be driven in the ring (7)	1
	— 17
	<u>279</u>

JUMPING.

1. Horses or ponies, any height	10
2. Horses or ponies, any height—handicap	10
3. Horses or ponies, any height—handicap	10
4. Horses or ponies, any height	10
	— 40

3. SHEEP.

BLACKFACE.

84. Tups above one shear	16
85. Shearling tups	21
86. Shearling tups, which shall have been entirely out-wintered, and which shall not have been clipped before 1st May 1921	21
87. Ewes above one shear, with lambs at foot	15
88. Shearling ewes or gimmers	19
	— 92

CHEVIOT.

89. Tups above one shear	12
90. Shearling tups	23
91. Ewes above one shear, with lambs	9
92. Shearling ewes or gimmers	11
	— 55

BORDER LEICESTER.

93. Tups above one shear	3
94. Shearling tups	25
95. Ewes above one shear	7
96. Shearling ewes or gimmers	19
	— 54

HALF-BRED.

97. Tups above one shear	1
98. Shearling tups	7
99. Ewes above one shear	3
100. Shearling ewes or gimmers	6
101. Three ewe lambs	5
	— 22

OXFORD DOWN.

102. Shearling tups	12
103. Shearling ewes or gimmers	9
104. Tup lambs	7
105. Three ewe lambs	5
	— 33

SUFFOLK.

106. Shearling tups	5
107. Shearling ewes or gimmers	10
108. Tup lambs	11
109. Three ewe lambs	6
Extra stock	1
	— 33

SHROPSHIRE.

110. Shearling tups	8
111. Shearling ewes or gimmers	5
	<hr/> 8

FAT SHEEP.

112. Three fat lambs, any breed or cross	4
	<hr/> 4
	<hr/> 301

4. GOATS.

OPEN CLASSES.

113. Male goats, any variety, over one year	7
114. Female goats, any variety, over two years	15
115. Goatlings, any variety, over one and not exceeding two years	13
116. Male kids, any variety, not exceeding one year	6
117. Female kids, any variety, not exceeding one year	15
118. Milking competition, open to Classes 114 and 120 (animals two years and over) (12)	1
	<hr/> 57

CONFINED TO SCOTTISH EXHIBITORS.

119. Male goats, one year old and over, any variety (5)	1
120. Female goats, in milk, any age (11)	1
	<hr/> 2
	<hr/> 59

5. PIGS.

LARGE WHITE.

121. Boars farrowed before 1920	7
122. Boars farrowed in 1920	5
123. Boars farrowed in 1921	9
124. Sows farrowed before 1920	8
Extra stock	2
125. Sows farrowed in 1920	7
126. Sows farrowed in 1921	13
	<hr/> 51

MIDDLE WHITE.

127. Boars, any age	6
128. Boars farrowed in 1921	7
129. Sows, any age	5
130. Sows farrowed in 1921	10
	<hr/> 28

BERKSHIRE.

131. Boars, any age	4
132. Boars farrowed in 1921	4
133. Sows, any age	6
134. Sows farrowed in 1921	4
	<hr/> 18

LARGE BLACK.

135. Boars, any age	11
136. Boars farrowed in 1921	10
137. Sows, any age	26
138. Sows, farrowed in 1921	10
	<hr/> 57

GLOUCESTERSHIRE OLD SPOTS.

139. Boars, any age	4
140. Boars farrowed in 1921	3
141. Sows, any age	5
Extra Stock	1
142. Sows farrowed in 1921	5
	— 18

CUMBERLAND.

143. Boars, any age	3
144. Boars farrowed in 1921	2
145. Sows, any age	6
146. Sows farrowed in 1921	4
	— 15

TAMWORTH.

Extra Stock (Boar)	1
	— 1
	188

6. POULTRY.

1-109. Poultry	582
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7. DAIRY PRODUCE.

1. Powdered butter, not less than 3 lb.	13
2. Fresh butter, three 1-lb. rolls	14
3. Cheddar cheese, 56 lb. and upwards	18
4. Sweet-milk cheese, flat shape, white in colour, made according to the Dunlop or other method	5
5. Cheese, 14 lb. and under	16
	— 66

8. BEE APPLIANCES AND HONEY, &c.

OPEN CLASSES—APPLIANCES.

1. Collection of hives and appliances	3
2. Best and most complete standard frame hive for general use, un- painted	4
3. Best and most complete standard frame hive for cottager's use, un- painted	3
4. Any new appliance connected with Bee-keeping to which no prize has been awarded at any previous Highland Show	6
	— 16

HONEY, &c.

5. Six sections of comb honey	6
6. Six jars of run or extracted light-coloured honey, approximate weight 6 lb.	4
7. Six jars of run or extracted medium or dark-coloured honey, excluding heather, approximate weight 6 lb.	2
8. Six jars of pressed heather honey in liquid form, approximate weight 6 lb.	1
9. Six jars of granulated honey, approximate weight 6 lb.	4
10. One shallow frame of comb honey for extracting purposes	3
11. Products made with the aid of honey . . . . .	...
12. Best display of honey in any form staged in space 3 feet by 3 feet, height from table not exceeding 4 feet	1
13. Best exhibit of not less than 1 lb. of wax in any form	6
14. Best exhibit of not less than 1 lb. of wax made into shape for retail trade and over-counter trade	3
15. Observatory hive with queen and bees	5
16. Exhibit of scientific nature	1
	— 36

CONFINED TO SCOTTISH EXHIBITORS.

17. Six sections of comb honey	8
18. Six jars of run or extracted medium or dark-coloured honey, approximate weight 6 lb.	1
19. Six jars of run or extracted light-coloured honey, approximate weight 6 lb.	5
	— 14
	<u>66</u>

9. WOOL.

PURE BREED CLASSES.

1. Blackface ewe	11
2. Blackface wedder	5
3. Blackface hogg	13
4. Cheviot ewe	7
5. Cheviot hogg	7
6. Border Leicester ewe	2
7. Border Leicester hogg	2
8. Half-bred ewe	3
9. Half-bred hogg	3
10. Shetland ewe	3
11. Shetland hogg	2
	— 58

ABSTRACT.

	No. of Entries
1. Cattle	367
2. Horses	279
3. Sheep	301
4. Goats	59
5. Pigs	188
6. Poultry	582
7. Dairy produce	66
8. Bee Appliances and Honey, &c.	66
9. Wool	58
	<u>1966</u>

The following table gives a comparative view of the entries of cattle, horses, sheep, pigs, poultry, dairy produce, bee appliances and honey, &c., wool and implements, of the value of the premiums offered, and of the receipts at the entrance-gates, grand stands, and for catalogues at the Shows which have been held in the Stirling Show District:—

Year.	Cattle.	Horses.	Sheep.	Wool.	Pigs.	Goats.	Poultry.	Dairy Produce.	Bee Appliances &c.	Implements.	Premiums.	Drawings at Show.
1833 .	288	68	60	...	40	...	...	...	...	22	£553	£211
1864 .	397	181	262	...	50	...	84	...	...	973	1350	1,729
1873 .	406	297	278	...	62	...	387	...	...	1400	1860	3,140
1881 .	336	215	211	...	29	...	294	...	...	2001	2340	2,577
1891 .	318	252	210	...	41	...	317	65	...	1563	2114	2,930
1900 .	321	288	369	24	28	...	457	66	...	2095	2895	4,805
1909 .	330	355	249	...	54	...	539	49	...	1977	8017	4,638
1921 .	367	279	299	56	188	59	582	66	66	2201	5055	12,764

A COMPARISON.

The following figures relating to some of the most successful Shows the Society has held will be perused with interest :—

	Cattle.	Horses.	Sheep.	Pigs.	Poultry.	Total Live Stock.	Implements.	Premiums.	Drawings at Show.	Profit.
Glasgow, 1867 .	286	212	257	58	150	963	1844	£1600	£3,005	£1307
Edinburgh, 1869	310	212	340	22	239	1123	1900	1600	4,078	2067
Glasgow, 1875 .	411	405	296	48	479	1639	2220	2665	6,231	3316
Edinburgh, 1877	339	342	305	30	234	1250	2292	2714	6,734	3710
Edinburgh, 1884	580	453	493	35	253	1814	2282	4343	6,548	1855
Edinburgh, 1893	380	349	294	31	360	1414	2268	2600	4,918	2323
Aberdeen, 1894 .	314	324	184	34	365	1221	2532	2440	5,121	1678
Perth, 1896 .	292	258	204	20	374	1148	1945	2205	4,788	2511
Glasgow, 1897 .	317	350	245	30	275	1217	2227	2897	4,392	2021
Edinburgh, 1899	386	518	477	46	551	1978	2585	3844	10,235	3911
Stirling, 1900 .	321	288	369	28	457	1463	2095	2915	4,305	1078
Inverness, 1901 .	360	257	204	22	499	1340	1460	2806	2,485	99
Aberdeen, 1902 .	330	253	243	42	475	1343	1988	2796	4,413	1604
Perth, 1904 .	348	315	283	35	413	1394	1972	3058	4,993	1828
Glasgow, 1905 .	310	462	284	60	534	1750	1875	3702	4,473	1203
Peebles, 1906 .	253	258	291	40	438	1280	1658	3072	2,596	416
Edinburgh, 1907	363	464	352	58	605	1842	2140	3614	7,061	2309
Aberdeen, 1908 .	331	299	237	42	509	1418	1931	3045	4,596	1881
Stirling, 1909 .	330	355	249	54	539	1527	1977	3017	4,638	1100
Dumfries, 1910 .	270	355	295	54	481	1455	1950	3057	3,411	562
Paigley, 1913 .	408	472	334	48	536	1798	1968	5109	6,468	2527
Edinburgh, 1919	215	301	221	43	398	1238	1605	4517	17,377	3275
Aberdeen, 1920 .	340	250	279	112	597	1597	2065	4608	14,120	1679

CATTLE.

There was an excellent display of cattle, practically all classes being well filled. Shorthorns were particularly strong, there being an entry of 94 animals, compared with 63 at Aberdeen the previous year, and few of those entered were absent. Mr Albert James Marshall, Bridgebank, Stranraer, repeated his success of last year by winning the President's Medal for the best Shorthorn. This he did with his massive roan two-year-old bull "Bridgebank Paymaster," 154,308 (Fig. 47), got by "Gainford Ringleader," 136,657, out of "Princess Christina." This bull was bred by the exhibitor, and won supreme championship honours at the Royal Show at Derby. In addition to the President's Medal, he was awarded the Renfrewshire Perpetual Gold Challenge Cup, the Shorthorn Society's Special Prize of £20 for the best bull, the Duthie Perpetual Challenge Cup, and the Tweeddale Gold Medal.

Shorthorn cows and heifers were numerous, and made a fine display. The Shorthorn Society's Special Prize of £20 for the best female was won by "Dorothy 13th," a five-year-

old red cow, bred and exhibited by Mr A. G. Maxtone Graham, Redgorton, Perth.

Aberdeen-Angus entries were less numerous than last year, but a high standard of quality was shown throughout. The President's Champion Medal and the Aberdeen-Angus Cattle Society's Champion Gold Medal were awarded to Mr W. Gilchrist Macbeth, Dunira, Comrie, for his two-year-old heifer "Buxom Maid of Connage," 65,203 (Fig. 48), bred by Mr F. G. M'Conachie, Connage, Buckie, and got by "Elation of Inchgower," 40,850, out of "Beaming Maid of Connage," 60,695. The Ballindalloch Challenge Cup for the best bull was won by Mr H. L. C. Brassey, M.P., Apethorpe Hall, Peterborough, with "Black Knight of Auchterarder," 45,102; and the Ballindalloch Challenge Cup for the best cow by Mr James Kennedy of Doonholm, Ayr, with "Marsala," 62,717.

There was a very fine show of Galloway cattle, particularly in the female classes, which were well filled, and contained many animals of first quality. The champion, however, was found in the aged bull class, the President's Medal and also the Dr Gillespie Memorial Challenge Trophy being won by Mr W. Betts Donaldson, Auchineden, Blanehead, with "Tarbreoch Cæsar," 13,065 (Fig. 49), a massive, level-fleshed bull of good breed character. He was bred by Mr John Cunningham, Tarbreoch, Dalbeattie, and got by "Cæsar," 10,697, out of "Tarbreoch Doris 3rd," 19,511.

Entries of Highland cattle numbered 42, and, as usual, provided a picturesque display. Quality was well maintained. The winner of the President's Medal was "Caroline II." (Fig. 50), a yellow three-year-old heifer of exceptional merit, bred and exhibited by the Earl of Southesk, Kinnaird Castle, Brechin, and got by "Asgard," 2377, out of "Princess Caroline," 7392. This animal also won the Highland Cattle Society's Perpetual Victory Challenge Cup for the best animal in the female classes. The Perpetual Victory Challenge Cup for the best bull was won by Mr John F. Christie, Netherton, Balfron, with his yearling, "Ceatharnach a Rithist of Garth," bred by the late Lady Currie of Garth, and got by "Raonull Buidhe of Atholl," 3009, out of "Ban Righ of Garth," 8884.

Ayrshires provided one of the best exhibitions in the history of the Society. There was an entry of 64, most of whom were forward, and the quality was extraordinarily high. The President's Champion Medal for the best animal of the breed went to Mr Adam W. Montgomerie, Lessnessock, Ochiltree, for his handsome six-year-old cow, "Lochdougan Princess 3rd," A 6372 (Fig. 51), bred by Mr Thomas Douglas, Lochdougan, Castle Douglas, out of "Lochdougan Princess," by "Lochdougan Admiral," 12,669.

British Friesians, although not so numerous as at Aberdeen, provided a good display, and attracted considerable attention.

The average standard of merit was admitted to be high. The President's Champion Medal was again secured by last year's winner, "Lochlands Pel Naspa," 40,376 (Fig. 52), a two-year-old heifer of outstanding quality. She is now the property of the Trustees of Mr Alasdair W. McRobert, Douneside, Tarland, and was bred by Mr Adam Smith, Lochlands, Larbert, out of "Lochlands Nemo," 15,340, by "Cradlehall (Imp.) Hollander II.," 3737.

HORSES.

There was the usual excellent display of Clydesdale Stallions, although the numbers in the aged class were smaller than usual, and the total number was slightly less than last year. The President's Champion Medal for the best stallion or colt went to Mr Andrew M. Montgomery of Nether Hall, Castle Douglas, for "Fyvie Sensation," 20,042 (Fig. 53), which won the same honour last year. This colt is now three years old, of good size, and beautiful quality. He was bred by Messrs J. & P. Donald, Lethen, Fyvie, and got by "Hiawatha Again," 18,765, out of "Lady Ivo," 40,779. This animal also won the Paisley Perpetual Gold Challenge Cup.

There was a very good show of Draught Geldings. The President's Champion Medal was won by the Scottish Co-operative Wholesale Society, Ltd., Glasgow, with "Top Line" (Fig. 54), a chestnut four-year-old, bred by Mr Stewart, Fardle, Meikleour, and got by "Foot Line."

Clydesdale Mares and Fillies also made a capital show, some first-class animals being shown. The President's Champion Medal, and also the Cawdor Cup, were secured by Mr William Brown, Craigton, Bishopton, with his celebrated black seven-year-old mare "Farleton Lady Alice," 47,512 (Fig. 55), got by "Dunure Footprint," 15,203, out of "Chrissy Sleigh," 35,206. She was bred by Messrs J. & P. Donald, Lethen, Fyvie, who also bred the champion in the stallion classes.

Hunters, as last year, were a small section. Mr Moffat S. Thomson, Spotsmains, Kelso, won the President's Medal for the best hunter with his chestnut two-year-old gelding "Cheerio" (Fig. 56), bred by Mr C. Young, The Wellands, Pilton, Shepton Mallet, and got by "Gay Lally," out of "Pussyfoot." The same exhibitor also won the Hunters' Improvement Society's Champion Gold Medal for the best Hunter Filly with a yearling chestnut filly of his own breeding, and got by "Mon Bonheur," out of "Biddy."

Hackneys and Ponies were also small in numbers. The President's Medal for the best Hackney, and the Hackney Horse Society's Champion Prize for the best Mare or Filly in the Hackney or Pony Classes, were won by Mr Enoch

Glen, Kaim Park, Bathgate, with his well-known brood mare "Flash Clara," 19,087 (Fig. 57), bred by the late Sir Walter Gilbey, Bart., and got by "Royal Danegelt," 5785, out of "Bonnie Clara," 6419. The President's Champion Medal for the best pony went to Mr William S. Miller of Balmanno Castle, Bridge of Earn, for his noted mare "Kitty Melbourne," 20,795 (Fig. 58), bred by the late Mr Walter Cliff, Melbourne Hall, York, and got by "Successful," 8314, out of "Wortly Kitty," 16,375.

There was a good show of Highland Ponies, 27 animals being entered in four classes. Mr Kenneth L. Macdonald, Tote, Portree, Skye, won the President's Medal with "Glenmore" (Fig. 59), a three-year-old dun stallion, bred by exhibitor, and got by "Glenbernisdale," out of "Mary of Strathaird," 3498. This animal also won the Special Prize of £15 given by the National Pony Society.

Western Island Ponies numbered 15, and the President's Medal was won by Mr Allan J. Bowie, Thrushcraig, Paisley, with "Lord of the Isles," 999 (Fig. 60), a beautiful, two-year-old, silver-grey colt, bred by exhibitor, and got by "Bonnie Laddie," 329, out of "Thrushcraig Ideal," 3116.

Shetland Ponies were not so numerous as last year, but there was no falling off in quality, and they provided a very attractive display. Mrs Etta Duffus, Penniwells, Elstree, Herts., won the President's Medal with "May Queen of Penniwells," 3348 (Fig. 61), a beautiful ten-year-old mare, bred by exhibitor, and got by "Dante of Coalville," 444, out of "Mayfly of Penniwells," 2582.

There was a fair entry of Harness Horses. The President's Medal was won by Mr William S. Miller of Balmanno Castle, Bridge of Earn, with his stylish four-year-old mare "Charm," 25,396 (Fig. 62), bred by Mr Enoch Glen, and got by "Harviestoun Mahratta," 12,650, out of "Glenavon Pearl," 23,567.

The Jumping Competitions secured a good entry, and, as usual, attracted much interest.

SHEEP, PIGS, &C.

Sheep were strong in numbers, especially the Blackfaces, and altogether provided a remarkably fine display. In the Pig Section there were new classes for Gloucestershire Old Spots and Cumberlands. All classes were well filled, and the total entry of 188 pigs was the largest in the history of the Society. There was a much larger entry of Goats than in the previous year. The winners of the President's Champion Medals are shown in Figs. 63-76.

There was also a very fine display in the sections for Poultry, Dairy Produce, Wool, and Bee Appliances and Honey.



Fig 47.—SHORTHORN BULL, "BRIDGEBANK PAYMASTER" 154,308
 Winner of President's Medal for best Shorthorn Stirling Show 1921 Bred by and the
 property of Mr Albert James Marshall Bridgebank, Stranraer Age two years and
 five months



Fig. 48.—ABERDEEN ANGUS HEIFER, "BUNOM MAID OF CONNAGE" 65,203
 Winner of President's Medal for best Aberdeen Angus animal Stirling Show, 1921 The
 property of Mr W Gilchrist Macbeth Dunira, Comrie Bred by Mr F G M'Conachie
 Connage, Buckie Age two years and four months

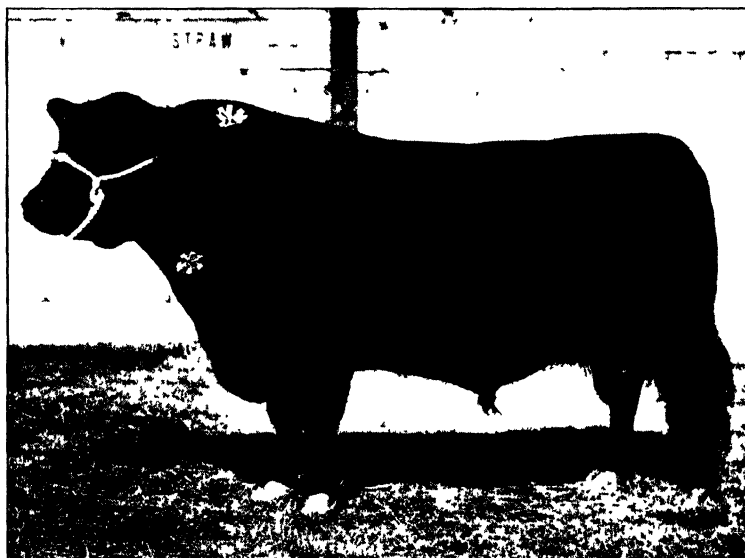


Fig. 49.—GALLOWAY BULL, "TARBROCH CÉSAR" 13,065.

Winner of President's Medal for best Galloway, Stirling Show, 1921. The property of Mr W. Betts Donaldson, Auchmeden, Blairfield. Bred by Mr John Cunningham, Tarbroch, Dalbeattie. Age five years and six months.



Fig. 50.—HIGHLAND HEIFER, "CAROLINE II."

Winner of President's Medal for best Highland animal, Stirling Show, 1921. Bred by and the property of The Earl of Southesk, Kinnaird Castle, Brechin. Age three years.



Fig 51 AYRSHIRE COW, 'LOCHDOULGAN PRINCESS 3RD' A 6372

Winner of President's Medal for best Ayrshire animal Stirling, Show, 1921. The property of Mr Adam W. MacIntyre, Lessness, Kirkcaldy. Bred by Mr Thomas Douglas, Lochdoulgan, Castle Douglas. Age six years and four months.



Fig 52 —BRITISH FRIESIAN HEIFER, 'LOCHLANDS PEL NASIA' 40,376

Winner of President's Medal for best British Friesian animal Stirling, Show, 1921. The property of the Trustees of Alastair W. M. Robert, Doune-side Tarland, Aberdeenshire. Bred by Mr Adam Smith, Lochlands, Larbert. Age two years and four months.

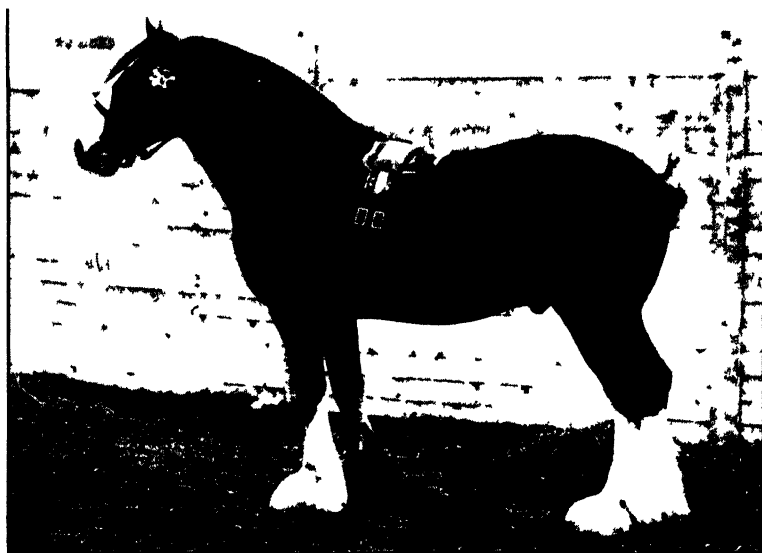


Fig 53 —CLYDESDALE COLT, 'FYVIE SENSATION' 20 042

Winner of President's Medal for best Clydesdale Stallion or Colt, Stirling Show 1921. The property of Mr Andrew M. Montgomery of Netherhall, Castle Douglas. Bred by Messrs J. & P. Donald. Icthon Fyvie. Age three years and two months.

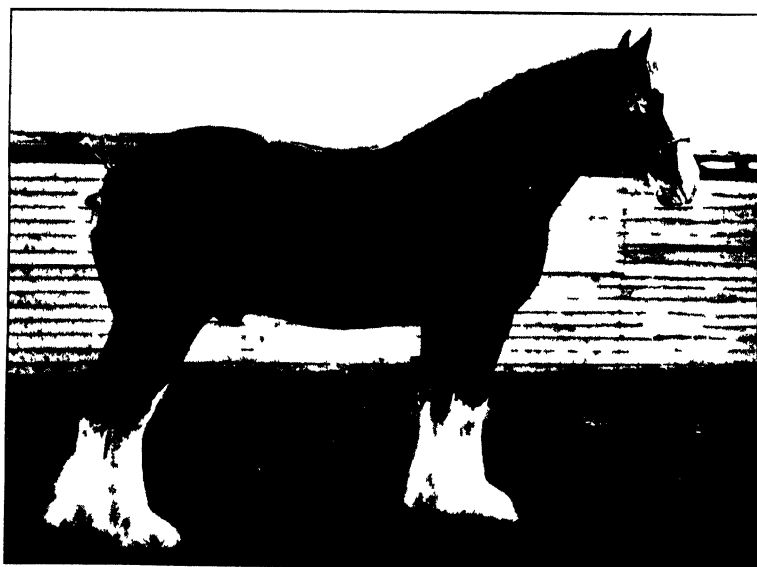


Fig 54 —DRAUGHT GELDING, 'TOL LINE'

Winner of President's Medal for best Draught Gelding, Stirling Show 1921. The property of the Scottish Co-operative Wholesale Society Limited Glasgow. Bred by Mr Stewart Fardle Melkour. Age four years.

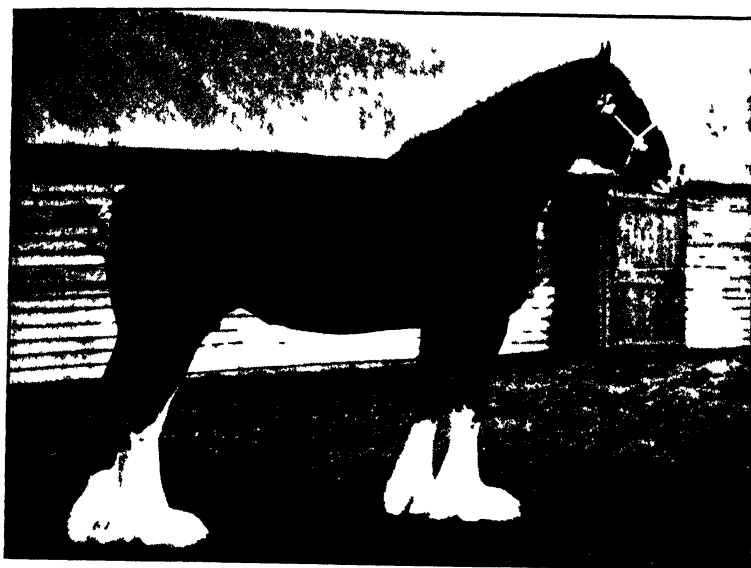


Fig 55 —CLYDESDALE MARE, PARLETON LADY ALICE 47,512
Winner of President's Medal for best Clydesdale Mare or Filly Stirling Show 1921 The property of Mr William Brown Craighan Bishopton Bred by Messrs J & L Duffell, Fife then 1921 Age seven years and two months

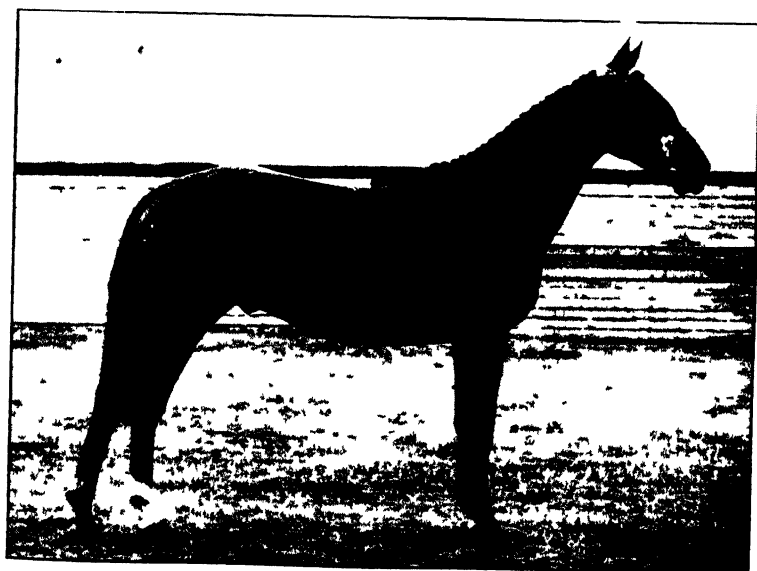


Fig 56 —HUNTER GELDING, CHEFRIO 3
Winner of President's Medal for best Hunter Stirling Show, 1921 The property of Mr Moffat & Thomson, Spotsmans, Kelso Bred by Mr C Young, The Wellands, Piton, Shepton Mallet Age two years and one month

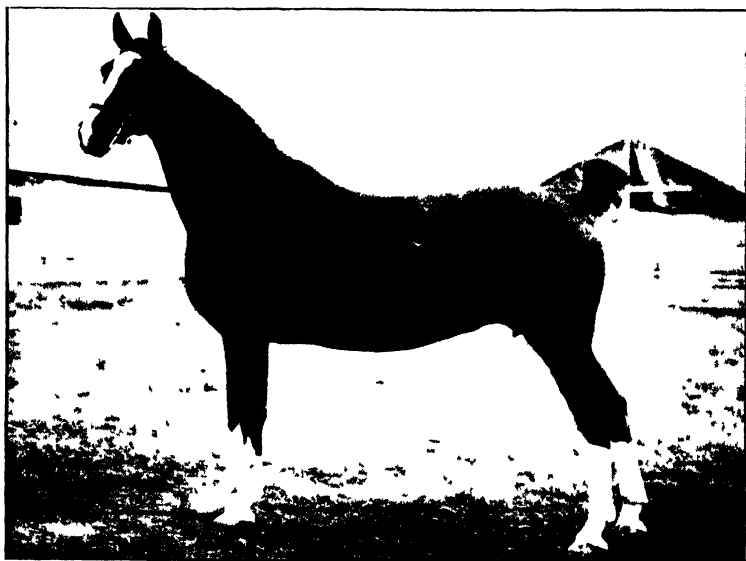


Fig 57 —HACKNEY BROOD MARE, "FLASH CLARA" 19 087

Winner of President's Medal for best Hackney, Stirling Show, 1921. The property of Mr Enoch Glen, Kinn Park, Ruthgate. Bred by the late Sir Walter Gilbey, Bart., Elstead Hall, Essex. Age fifteen years.

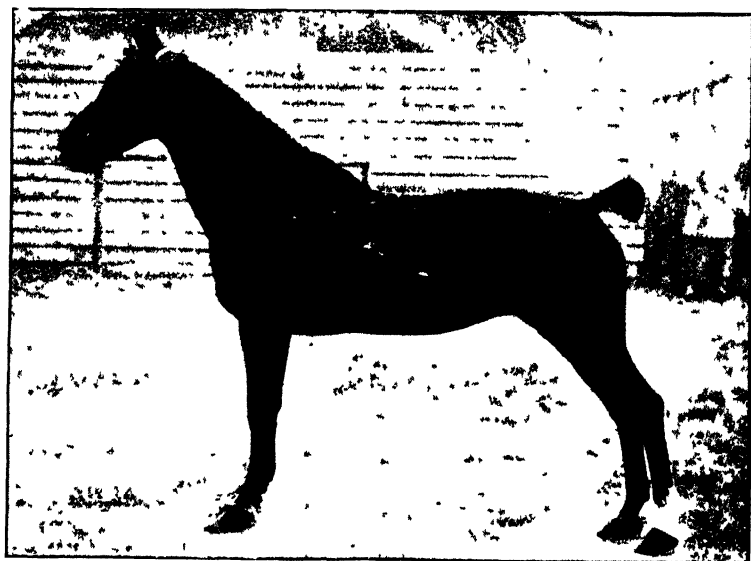


Fig 58 —PONY MARE, "KITTY MELBOURNE" 20,795

Winner of President's Medal for best Pony, Stirling Show, 1921. The property of Mr William S. Miller of Balmanno Castle, Bridge of Eirn. Bred by the late Walter Cliff, Melbourne Hall, York. Age twelve years.

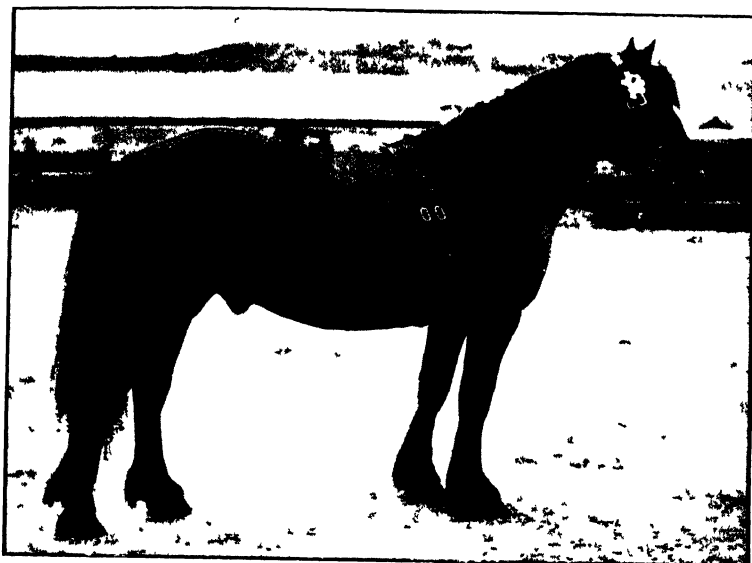


Fig 59 —HIGHLAND PONY STATION, "GLENMORE."

Winner of President's Medal for best Highland Pony, Stirling Show, 1921. Bred by and the property of Mr Kenneth I Macdonald, Tobermory, Isle of Skye. Age three years and one month.



Fig 60 —WESTERN ISLAND COIT, "LORD OF THE ISLES" 999

Winner of President's Medal for best Western Island Pony, Stirling Show 1921. Bred by and the property of Mr Allan J Bowie, Thruherug, Paisley. Age two years and one month.

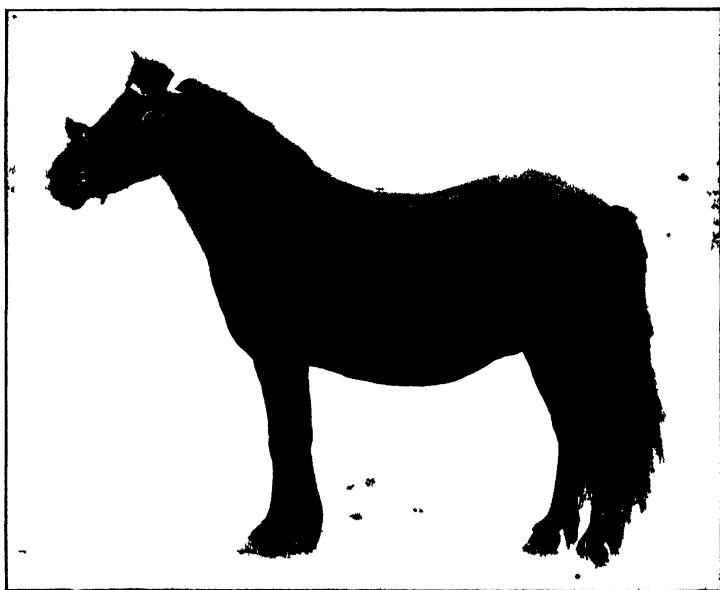
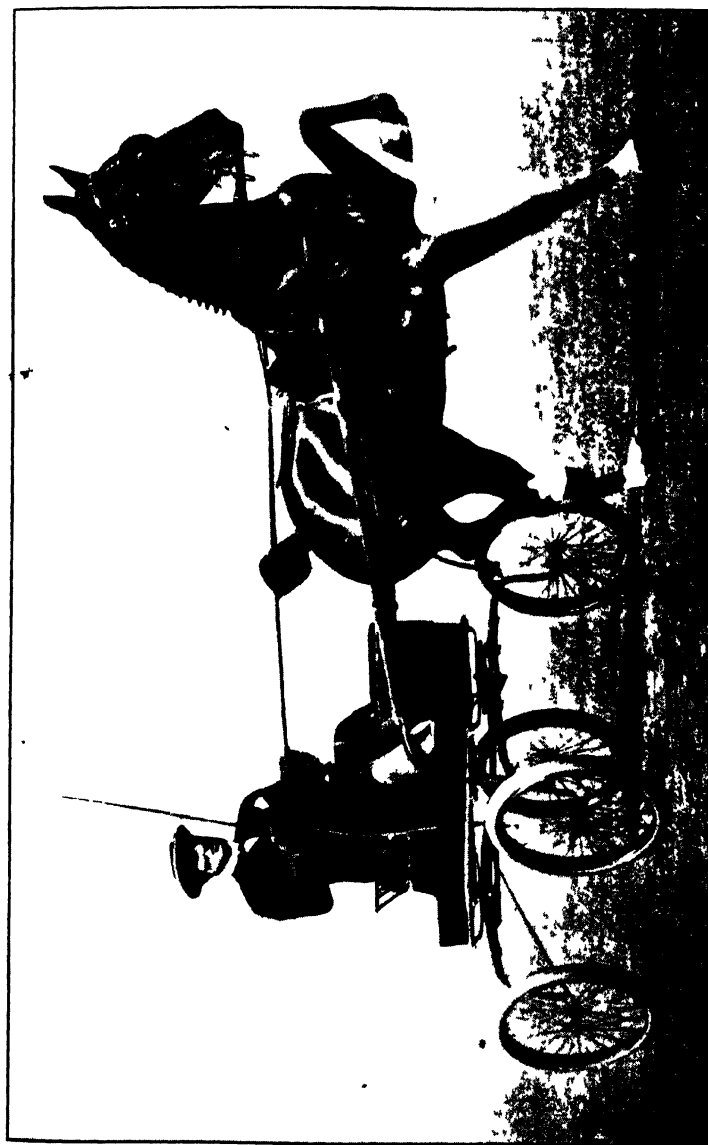


Fig. 61 — SHETLAND PONY YIDD MARE, 'MAY QUEEN OF PINNIWILLS' 3318

Winner of President's Medal for best Shetland Pony, Stirling Show, 1921. Bred by and the property of Mrs Little Dullis Pinniwells, Elstree, Herts. Age ten years and two months.



(Photo by W. H. Rogers & Co., Ltd.)

Fig 62 — MARI IN HARNESS, "CHARM" 25,396

Winner of President's Medal for best animal in the Classes for Horses in Harness, Stirling Show, 1921
of Bulmanno Castle, Bridge of Earn Bred by Mr Enoch Glen, Kaim Park, Bathgate

The property of Mr William S. Miller
Age four years



Fig 63 —BLACKFACE TUP, "UNIVERSAL"

Winner of President's Medal for best Blackface, Stirling Show, 1921. Bred by and the property of Mr M. G. Hamilton Woolfords, Cobbinshaw. Age three shear.



Fig 64.—CHEVIOT TUP, "GRAND PARADE" 3327.

Winner of President's Medal for best Cheviot, Stirling Show, 1921. The property of Mr Walter S Douglas, Hindhope, Jedburgh. Bred by Mr A. H. Galbraith, Biggershiels, Peebles. Age three shear.

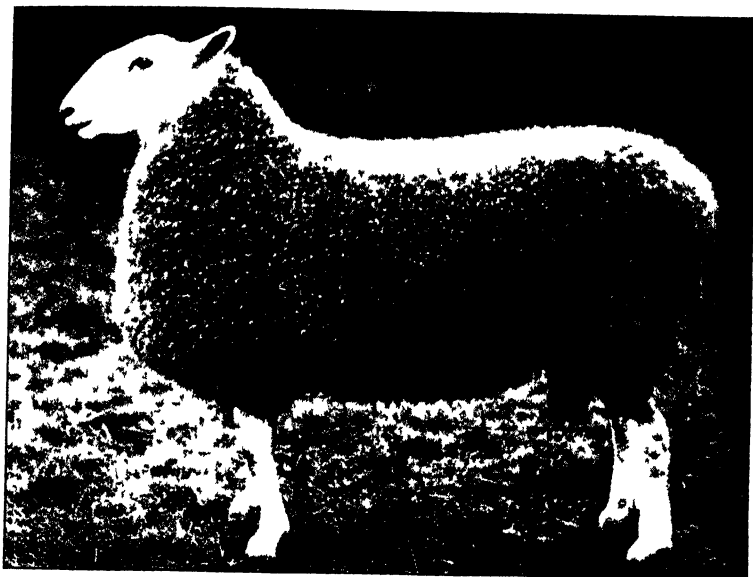


Fig 65 BORDER LEICESTER SHEARING TUP, W 23

Winner of President's Medal for best Border Leicester Stirling Show, 1921 Bred by and the property of Mr W Gilchrist Macbeth Dunna, Comrie

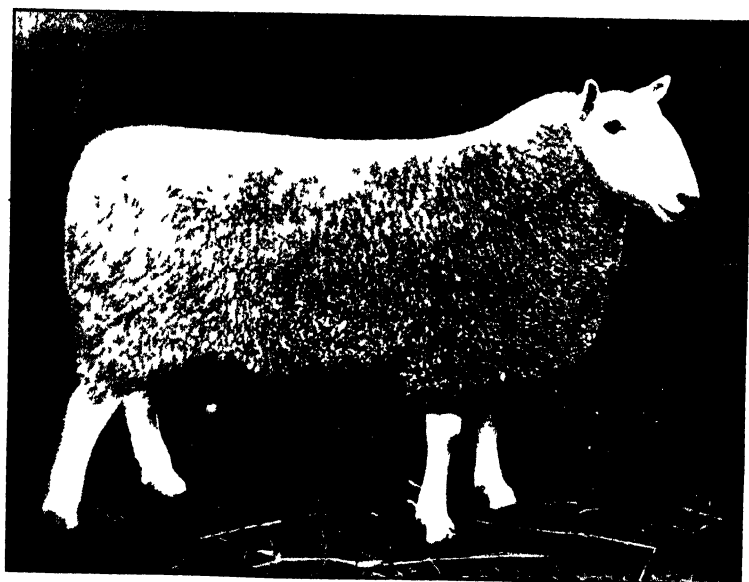


Fig 66 —HALF BREED SHEARING TUP

Winner of President's Medal for best Half bred Stirling, Show, 1921 Bred by and the property of Mr Thomas Armstrong Fast Cote, Hawick

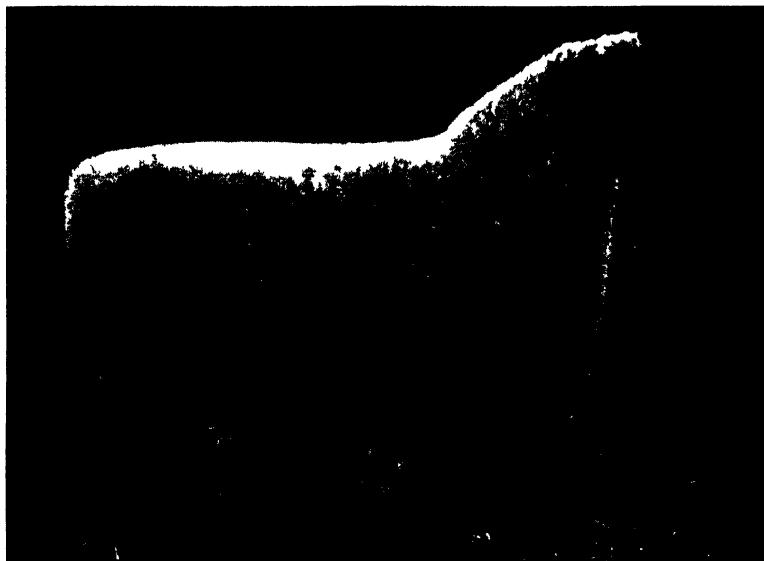


Fig 67 —OXFORD DOWN SHEARLING LAMB

Winner of President's Medal for best Oxford Down Shearling, Show 1921. Bred by and the property of Messrs T. & M. Jephcott, Southampton, Hants.



Fig 68 —SUFFOLK TERRIER LAMB

Winner of President's Medal for best Suffolk Terrier, Show 1921. Bred by and the property of Mr G. Bertram Shields, Dolphin, Stone, Cheshire, and Mr J. H. T. Trueman, East Lothian.



Fig 69 —SHROPSHIRE SHEARING TUP

Winner of President's Medal for best Shropshire, Stirling, Show 1921 Bred by and the property of Mr T. A. Buttar, Corston, Goupar, Angus



Fig 70 —ANGLO-NUBIAN SWISS FEMALE GOAT, "WITHDEAN TOPY" *2* 2662

Winner of President's Medal for best animal in the Goat Classes, Stirling, Show 1921. The property of the Baroness Burton, Dochfour, Inverness. Bred by Dr Clutterbuck, Mayfield, Lunenden Road, Brighton. Age five years and one month.



Fig. 71 — LARGE WHITE BOAR, 'STANDING WONDER 6111' 21,521

Winner of President's Medal for best Large White Pig, Stirling Show, 1921. The property of the Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh. Bred by Mr Alfred W. White, Killegorn Spalding. Age three years and six months.

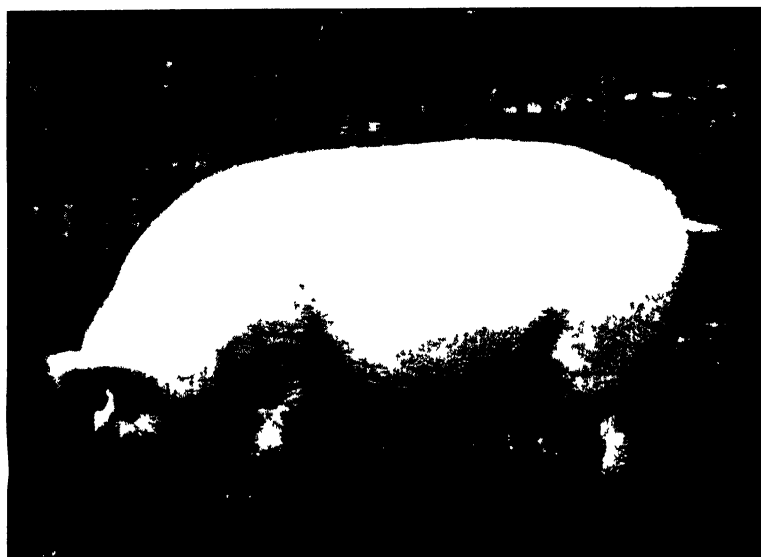


Fig. 72 — MIDDLE WHITE SOW, "HISION PIANISSIMO" 51,542

Winner of President's Medal for best Middle White Pig, Stirling Show, 1921. Bred by and the property of Mr John Chivers, Estate Office, Histon, Cambridge. Age five years and six months.

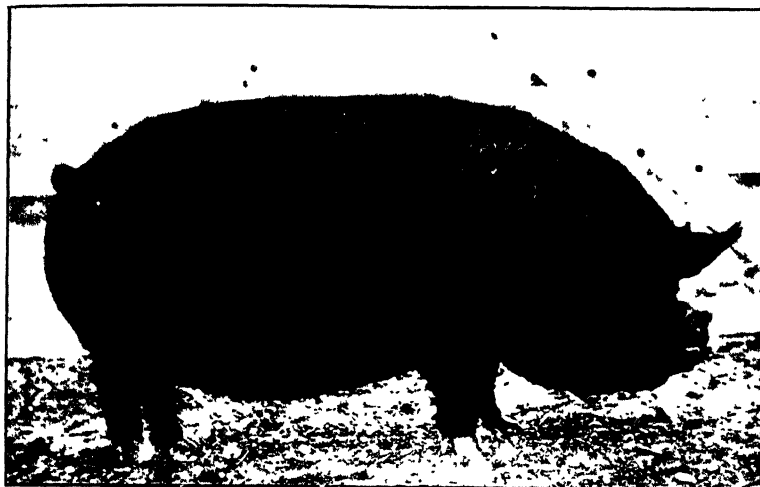
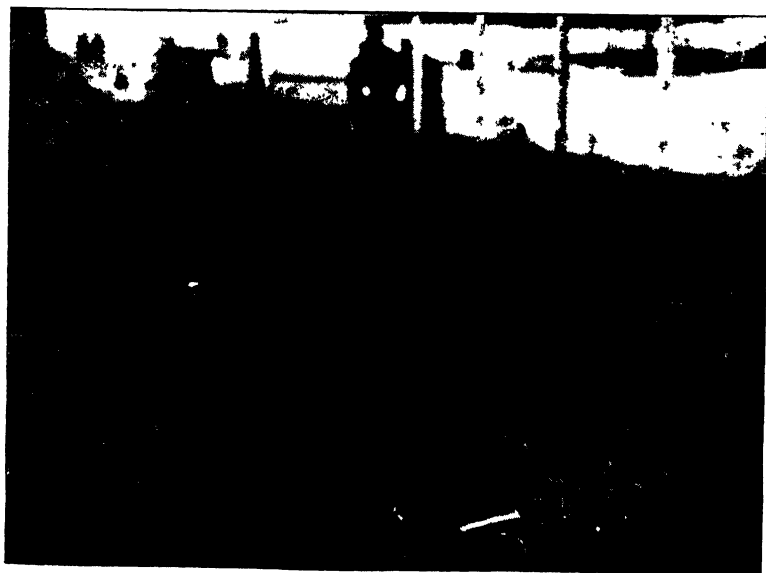


Fig. 73.—BERKSHIRE SOW, "MURRELL LASSIE" 19,975.

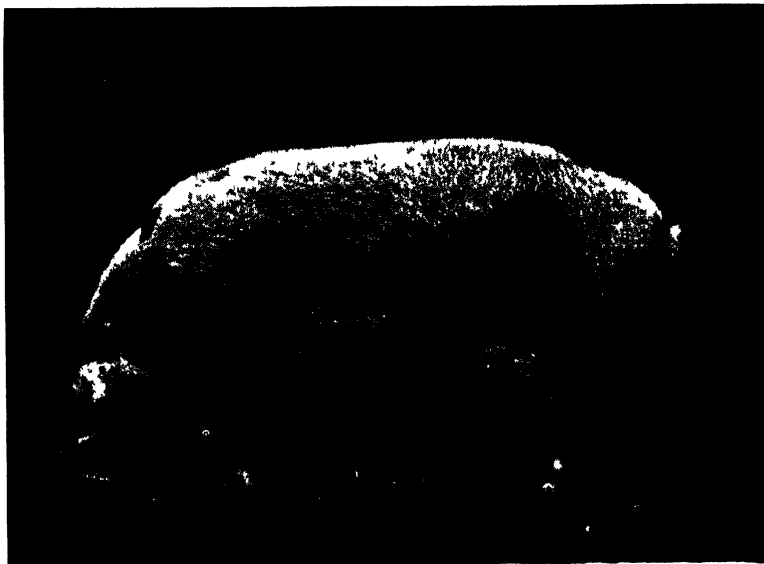
Winner of President's Medal for best Berkshire Pig, Stirling Show, 1921. Bred by and the property of Mr W. Howard Palmer, Stokes Farm, Wokingham, Berks. Age four years and two months.



(Photo by E. W. Lattorsall, Broadwick)

Fig. 74.—LARGE BLACK SOW, "EASTON BESSIE 1ST" 37,826.

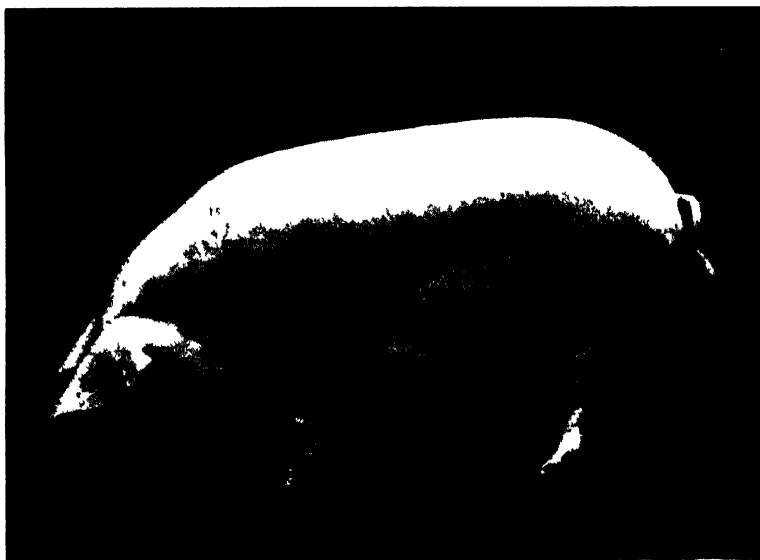
Winner of President's Medal for best Large Black Pig, Stirling Show, 1921. Bred by and the property of the Marquis of Graham, C.B., Easton Park, Wickham Market, Suffolk. Age two years and one month.



[Photo by E W Lattensall Bristol]

FIG. 75 —GLOUCESTERSHIRE OLD SPOT SOW, "SEVINGTON SEARCHLIGHT 2ND."

Winner of President's Medal for best Gloucestershire Old Spot Pig, Stirling Show, 1921. The property of the Marquis of Graham C B, Easton Park, Wickham Market, Suffolk. Bred by Mr C. Isaacs Sevington, Chippenham, Wilts. Age two years and three months.



[Photo by J Wilkinson, Wigton]

Fig. 76.—CUMBERLAND SOW, "SOUTHLEY BLOOM" 2698.

Winner of President's Medal for best Cumberland Pig, Stirling Show, 1921. Bred by and the property of Mr John Steel, M.R.C.V.S., Southley, Wigton, Cumberland. Age one year and six months.

PREMIUMS AWARDED BY THE SOCIETY IN 1921.

STIRLING SHOW

26th, 27th, 28th, and 29th July 1921.

ABBREVIATIONS.—V., *Very Highly Commended.* H., *Highly Commended.*
C., *Commended.*

CATTLE.

SHORTHORN.

PRESIDENT'S CHAMPION MEDAL for Best Shorthorn.

No. 15 Albert James Marshall, Bridgebank, Stranraer, " Bridgebank Paymaster " (154,308).

Renfrewshire Perpetual Gold Challenge Cup, value £250, *for Best Animal of the Shorthorn Breed, " Extra Stock " being eligible to compete.* This Cup, along with an endowment of £500, was provided from money collected in Renfrewshire by the late Provost Muir M'Kean of Paisley, and is in commemoration of the Society's first Show in the County of Renfrew in 1913.

No. 15 Albert James Marshall, Bridgebank, Stranraer, " Bridgebank Paymaster " (154,308).

The Duthie Perpetual Challenge Cup, value £150, *for best animal in the Shorthorn Classes, " Extra Stock " being eligible to compete.* This Cup along with an endowment fund, was gifted by Mr William Duthie, Collynie.

No. 15 Albert James Marshall, Bridgebank, Stranraer, " Bridgebank Paymaster " (154,308).

Tweeddale Gold Medal *for Best Shorthorn Bull.*—Annual Free Income from Fund of £500.

No. 15 Albert James Marshall, Bridgebank, Stranraer, " Bridgebank Paymaster " (154,308).

Best Shorthorn Bull in the Show, entered or eligible for entry in Coates's Herd Book—£20 given by the Shorthorn Society.

No. 15 Albert James Marshall, Bridgebank, Stranraer, "Bridgebank Paymaster" (154,308).

Silver Medal to the Breeder of the winner of above Prize—given by the Shorthorn Society.

No. 15 Albert James Marshall, Bridgebank, Stranraer.

Breeder of best Bull of any age in Classes 1, 2, and 3—The Silver Medal.

No. 15 Albert James Marshall, Bridgebank, Stranraer.

CLASS 1. BULL, calved before 1919.—Premiums, £15, £10, £5, and £3.

1st No. 6 John J. Moubray of Naemoor, Rumbling Bridge, "Garbity Field Marshall" (142,541).

2nd No. 1 A. V. Cameron, Newton of Stracathro, Brechin, "Beaufort Snow King" (140,873).

3rd No. 2 James Douglas Fletcher of Rosehaugh, Avoch, Ross shire, "Bilsington Illustrious" (147,311).

4th No. 5 Albert James Marshall, Bridgebank, Stranraer, "Collynie Sunrise" (148,047).

V No. 4 William T. Malcolm, Whittingehame Mains, Prestonkirk, "Beaufort Rothes Sultan."

CLASS 2. BULL, calved in 1919.—Premiums, £15, £10, £5, and £3.

1st No. 15 Albert James Marshall, Bridgebank, Stranraer, "Bridgebank Paymaster" (154,308).

2nd No. 7 James Cameron, Balnakyle, Munlochy, Ross-shire, "Millhills Macebearer" (157,773).

3rd No. 11 Robert Wylie Hill, Balthayock, Perth, "Lothian Buzzard" (157,426).

4th No. 12 William M'Allister, Drakies, Inverness, "Collynie Lord Violet" (154,923).

V No. 17 Major A. B. Murray of Polmaise, Stirling, "Kinellar Clarion" (156,908).

H No. 10 George Harrison, Gainford Hall, Darlington "Count Broad-hooks" (155,070).

C No. 16 Ian K. Morison, West Inchmichael, Errol, Perthshire, "Roysterer" (159,115).

The Emilio R. Casares, jun., "Junior Champion Challenge Cup," value £50, for *Best Shorthorn Bull in Class 3, calved on or after 1st April of the year preceding the Show, that has passed the tuberculin test*, given by Mr Emilio R. Casares, jun., London.

No. 41 Mrs. Duncan Stewart of Millhills, Crieff, "Prince Paul."

CLASS 3. BULL, calved in 1920.—Premiums, £12, £8, £4, and £2.

1st No. 35 The Earl of Moray, Doune Lodge, Doune, "Balcairn Guardsman."

2nd No. 41 Mrs Duncan Stewart of Millhills, Crieff, "Prince Paul."

3rd No. 34 Albert James Marshall, Bridgebank, Stranraer, "Double Event."

4th No. 28 A. W. Law, Whiterow, Forres, "Avril."

- V No. 40 James Sidey, Hallhole, Coupar-Angus, "Fairland."
 H No. 29 Charles E. Law, Brackla, Nairn, "Brackla Emperor."
 C No. 22 James Butters, Masterton, Dunfermline, "Clarama."
 C No. 27 A. W. Law, Whiterow, Forres, "Roths Masterpiece."

Best Shorthorn Female in the Show, entered or eligible for entry in Coates's Herd-Book.—£20, given by the Shorthorn Society.

No. 47 A. G. Maxtone Graham, Redgorton, Perth, "Dorothy 13th."

Silver Medal to the breeder of the winner of above Prize—given by the Shorthorn Society.

No. 47 A. G. Maxtone Graham, Redgorton, Perth.

CLASS 4. COW, calved before 1919, in Milk.—Premiums, £12, £8, £4, and £2.

- 1st No. 47 A. G. Maxtone Graham, Redgorton, Perth, "Dorothy 13th."
 2nd No. 52 John J. Moubray of Naemoor, Rumbling Bridge, "Naemoor Clipper 4th."
 3rd No. 50 William T. Malcolm, Whittingehame Mains, Prestonkirk, "Clipper Silver."
 4th No. 43 James Butters, Masterton, Dunfermline, "Broadhooks Bet."
 V No. 49 Messrs Jones, Dunmore Park, Larbert, "Loughgall Luxury."
 H No. 44 A. Cameron & Sons, Westside Farm, Brechin, Forfarshire, "Lady of the Lake 5th."
 C No. 45 Thomas Elder of Stevenson, Haddington, "Congalton Rosebud."

CLASS 5. HEIFER or COW, calved in 1919.—Premiums, £10, £5, £3 and £2.

- 1st No. 56 Captain A. M. Talbot Fletcher of Saltoun, Saltoun Hall, Pencaitland, East Lothian, "Bellona Girl" (2908).
 2nd No. 62 The Earl of Moray, Doune Lodge, Doune, "Doune Rosewood 4th" (5927).
 3rd No. 63 Major A. B. Murray of Polmaise, Stirling, "Polmaise Clara 13th" (6108).
 4th No. 59 George Harrison, Gainford Hall, Darlington, "Gainford Nonpareil Rosa" (3650).
 V No. 64 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, "Lothian Lady Belle."
 H No. 60 Messrs Jones, Dunmore Park, Larbert, "Notlaw Nonpareil 35th."
 C No. 61 William T. Malcolm, Whittingehame Mains, Prestonkirk, "Queen Pearl."

CLASS 6. HEIFER, calved in 1920.—Premiums, £10, £5, £3, and £2.

- 1st No. 83 Robert Wylie Hill, Balthayock, Perth, "Waterloo Aileen."
 2nd No. 94 Brig.-General Stirling of Keir, Dunblane, "Inschfield Clipper Fairy."
 3rd No. 87 John J. Moubray of Naemoor, Rumbling Bridge, "Naemoor Jealousy 7th."
 4th No. 85 The Earl of Moray, Doune Lodge, Doune, "Elise 7th."
 V No. 70 James Cameron, Balnakyle, Munloch, "Balnakyle Undine 2nd."
 H No. 82 Robert Wylie Hill, Balthayock, Perth, "Balthayock Augusta 21st."
 C No. 88 John J. Moubray of Naemoor, Rumbling Bridge, "Naemoor Maud 4th."
 C No. 92 Mrs Duncan Stewart of Millhills, Crieff, "Millhills Roths Queen 5th."

ABERDEEN-ANGUS.**PRESIDENT'S CHAMPION MEDAL for best Aberdeen-Angus Animal.**

No. 128 W. Gilchrist Macbeth, Dunira, Comrie, "Buxom Maid of Connage" (65,203).

Ballindalloch Challenge Cup, value £50, for the best Bull of any age in Classes 7, 8, and 9, given by the late Sir George Macpherson Grant, Bart.

No. 103 H. L. C. Brassey, M.P., Apethorpe Hall, Peterborough, "Black Knight of Auchterarder" (45,102).

Breeder of the Winner of the Ballindalloch Challenge Cup—The Silver Medal.

No. 103 A. T. Reid, Auchterarder House, Auchterarder.

Breeder of the best Bull of any age in Classes 7, 8, and 9—The Silver Medal.

No. 103 A. T. Reid, Auchterarder House, Auchterarder.

Champion Gold Medal for best animal in the Breeding Classes, *Breeding Animals shown as "Extra Stock" being eligible to compete*, given by the Aberdeen-Angus Cattle Society.

No. 128 W. Gilchrist Macbeth, Dunira, Comrie, "Buxom Maid of Connage" (65,203).

CLASS 7. BULL, calved before 1st December 1918.—
 Premiums, £15, £10, £5, and £3.

- 1st No. 98 A. W. Howieson, Lochbank, Blairgowrie, "Beholder of Ballindalloch" (42,835).
- 2nd No. 97 Sir George Macpherson Grant, Bart., The Castle, Ballindalloch, Banffshire, "Elorus of Ballindalloch" (41,330).
- 3rd No. 99 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, "Sapper 6th of Skillymarno" (43,737).
- 4th No. 100 Alexander Whyte, Easter Denoon, Glamis, Forfarshire, "Denoon Bold Boy" (41,112).
- V No. 96 George F. Barron, Thomastown, Auchterless, "Emperor of Harviestoun" (39,401).

CLASS 8. BULL, calved on or after 1st December 1918.—
 Premiums, £15, £10, £5, and £3.

- 1st No. 103 H. L. C. Brassey, M.P., Apethorpe Hall, Peterborough, "Black Knight of Auchterarder" (45,102).
- 2nd No. 104 Sir George Macpherson Grant, Bart., The Castle, Ballindalloch, Banffshire, "Prince Totmes of Ballindalloch" (46,734).
- 3rd No. 105 J. E. Kerr of Harviestoun, Dollar, "Ettrick of Harviestoun" (45,807).
- 4th No. 101 Viscount Allendale, South Acomb, Stocksfield-on-Tyne, "Exbert" (45,895).
- V No. 110 Sir John Stewart-Clark of Dundas, Bart., Dundas Castle, South Queensferry, West Lothian, "Ethic of Bleaton" (45,794).
- H No. 106 The Earl of Leven and Melville, Glenferness, Nairn, "Panmure of Auchterarder" (46,465).
- C No. 108 C. T. Scott, Buckland Manor, Broadway, Worcestershire, "Etrurian of Buckland" (45,802).

CLASS 9 BULL, calved on or after 1st December 1919.—
Premiums, £12, £8, £4, and £2.

- 1st No. 113 John M. Allan, Easter Duthill, Carr Bridge, Strathspey,
"Pundit of Moyness" (49,137).
2nd No. 114 Viscount Allendale, South Acomb, Stocksfield-on-Tyne,
"Placeman of Bywell" (48,929).
3rd No. 115 H. L. C. Brassey, M.P., Apethorpe Hall, Peterborough,
"El Khabir" (47,880).
4th No. 117 W. A. Stewart, Nether Blairrock, Cullen, "Eldon of Blairrock"
(47,832).

Ballindalloch Challenge Cup, value £50, for the best Cow of any age in Class 10, given by the late Sir John Macpherson Grant, Bart.

- No. 119 James Kennedy of Doonholm, Ayr, "Marsala" (62,717).

Breeder of the Winner of the Ballindalloch Challenge Cup—The Silver Medal.

- No. 119 James Kennedy of Doonholm, Ayr.

CLASS 10. COW, of any age, in Milk.—Premiums, £12, £8, £4, and £2.

- 1st No. 119 James Kennedy of Doonholm, Ayr, "Marsala" (62,717).
2nd No. 118 George Cran, Morlich, Glenkindie, Aberdeen, "Evolution
3rd of Ballindalloch" (52,516).

CLASS 11. HEIFER, calved on or after 1st December 1918.—
Premiums, £10, £5, £3, and £2.

- 1st No. 128 W. Gilchrist Macbeth, Dunira, Comrie, "Buxom Maid of
Connage" (65,203).
2nd No. 133 F. L. Wallace, Candacraig, Strathdon, Aberdeenshire,
"Bedraggled Maid of Ballindalloch" (64,729).
3rd No. 132 F. L. Wallace, Candacraig, Strathdon, Aberdeenshire,
"Pinky P. 2nd of Ballintomb" (63,874).
4th No. 129 Andrew T. Reid of Auchterarder House, Auchterarder,
"Proud Grisette" (65,624).
V No. 127 James Kennedy of Doonholme, Ayr, "Eufala" (65,044).
H No. 125 Sir George Macpherson Grant, Bart., The Castle, Ballin-
dalloch, Banffshire, "Exility of Ballindalloch" (64,740).
C No. 122 David Cross, Ingliston, Bishopton, "Phedre 3rd" (64,346).
C No. 134 Archibald Whyte, Spott, Kirriemuir, "Proud Witch"
(66,069).

CLASS 12. HEIFER, calved on or after 1st December 1919.—
Premiums, £10, £5, £3, and £2.

- 1st No. 140 Sir George Macpherson Grant, Bart., The Castle, Ballin-
dalloch, Banffshire, "Evelusive of Ballindalloch"
(67,167).
2nd No. 142 James Kennedy of Doonholme, Ayr, "Poetica of Doon-
holme" (67,481).
3rd No. 144 J. E. Kerr of Harviestoun, Dollar, "Eruca of Harviestoun."
4th No. 137 Viscount Allendale, South Acomb, Stocksfield-on-Tyne,
"Ella of Bywell" (66,267).
V No. 146 W. Gilchrist Macbeth, Dunira, Comrie, "Bellabloom"
(66,937).
H No. 148 Andrew Thomson Reid of Auchterarder House, Auchter-
arder, "Black Lass" (67,315).
G No. 143 James Kennedy of Doonholme, Ayr, "Euphens" (67,478).

GALLOWAY.**PRESIDENT'S CHAMPION MEDAL for best Galloway.**

No. 154 W. Betts Donaldson, Auchineden, Blanefield, "Tarbreoch Cæsar" (13,065).

Dr Gillespie Memorial Challenge Trophy, value £50, for best Galloway Animal registered in the Galloway Herd-Book, entered in any of the Breeding Classes, Breeding Animals shown as "Extra Stock" being eligible to compete—given by the Galloway Society of Great Britain and Ireland.

No. 154 W. Betts Donaldson, Auchineden, Blanefield, "Tarbreoch Cæsar" (13,065).

Breeder of best Bull of any age in Classes 13, 14, and 15—The Silver Medal.

No. 154 John Cunningham, Tarbreoch, Dalbeattie.

CLASS 13. BULL, calved before 1st December 1918.—
 Premiums, £15, £10, £5, and £3.

1st No. 154 W. Betts Donaldson, Auchineden, Blanefield, "Tarbreoch Cæsar" (13,065).

2nd No. 155 John Fraser, Barmark, Corsock, Dalbeattie, "Mormon of Dalwyne" (12,617).

3rd No. 157 Herbert Haggas, Barnsoul Farm, Dumfries, "Raleigh 2nd of Morrington" (13,011).

CLASS 14. BULL, calved on or after 1st December 1918.—
 Premiums, £15, £10, £5, and £3.

1st No. 158 John Fraser, Barmark, Corsock, Dalbeattie, "Barmark Clansman" (14,135).

2nd No. 160 D. & J. Little, Corriehalls, Lockerbie, "Kennedy of Killearn" (14,106).

3rd No. 159 Robert Graham, Auchengassel, Twynholm, "Dean of Castlemilk" (14,203).

CLASS 15. BULL, calved on or after 1st December 1919.—
 Premiums, £12, £8, £4, and £2.

1st No. 163 W. Betts Donaldson, Auchineden, Blanefield, "War Bond of Corriehalls" (14,518).

2nd No. 164 Robert Graham, Auchingassel, Twynholm, "Ideal of Ardachie" (14,453).

3rd No. 165 Robert Graham, Chapel of Logan, Canonbie, "Horace of Killearn" (14,429).

CLASS 16. COW, of any age, in Milk.—Premiums, £12, £8, £4, and £2.

1st No. 171 Robert Graham, Auchengassel, Twynholm, "Jenny of Auchengassel" (25,879).

2nd No. 166 Walter Biggar, Grange Farm, Dalbeattie, "Lizzie 15th of Chapelton" (25,156).

3rd No. 173 Robert Graham, Chapel of Logan, Canonbie, "Logan Lady 5th" (26,463).

4th No. 174 D. & J. Little, Corriehalls, Lockerbie, "Dorothy" (23,543).

V No. 172 Robert Graham, Chapel of Logan, Canonbie, "Gratitude 2nd of Logan" (25,338).

H No. 168 John Cunningham, Tarbreoch, Dalbeattie, "Tarbreoch Doris 13th" (26,357).

CLASS 17. HEIFER, calved on or after 1st December 1918.—
 Premiums, £10, £5, £3, and £2.

- 1st No. 176 John Cunningham, Tarbreoch, Dalbeattie, "Tarbreoch Blue Bell 3rd" (26,883).
 2nd No. 179 W. Betts Donaldson, Auchineden, Blane field, "Mona of Killearn" (26,898).
 3rd No. 178 W. Betts Donaldson, Auchineden, Blane field, "Olivia of Killearn" (26,897).
 4th No. 181 Robert Graham, Chapel of Logan, Canonbie, "Gratitude 4th of Logan" (26,995).
 V No. 183 D. & J. Little, Corriehalls, Lockerbie, "Nettie 5th of Corriehalls" (27,080).
 H No. 177 W. Betts Donaldson, Auchineden, Blane field, "Clare 4th of Killearn" (26,896).
 C No. 184 Arthur Young, Garroch, Dalry, Galloway, "Rambler of Waterside" (27,266).

CLASS 18. HEIFER, calved on or after 1st December 1919.—
 Premiums, £10, £5, £3, and £2.

- 1st No. 187 W. Betts Donaldson, Auchineden, Blane field, "Violet of Killearn" (27,495).
 2nd No. 185 Walter Biggar, Grange Farm, Dalbeattie, "Grange Lizzie" (27,388).
 3rd No. 188 John Fraser, Barmark, Corsock, Dalbeattie, "Polly Mormon" (27,545).
 4th No. 193 D. & J. Little, Corriehalls, Lockerbie, "Tarbreoch Bella" (27,478).
 V No. 192 Herbert Haggas, Barnsoul Farm, Dumfries, "Alice 2nd of Stepford" (27,407).
 H No. 186 John Cunningham, Tarbreoch, Dalbeattie, "Tarbreoch Doris 17th" (27,476).
 C No. 190 Robert Graham, Auchengassel, Twynholm, "Holehouse Daffodil" (27,886).

HIGHLAND.

PRESIDENT'S CHAMPION MEDAL for best Highland Animal.

- No. 236 The Earl of Southesk, Kinnaird Castle, Brechin, "Caroline II."
 Perpetual Victory Challenge Cup, approximate value 50 Guineas, *for the best Animal in the Male Classes, "Extra Stock" being eligible to compete*—given by the Highland Cattle Society of Scotland.
 No. 205 John F. Christie, Netherton, Balfon, Stirlingshire, "Ceatharnach a Rithist of Garth."

Breeder of best Bull of any age in Classes 19, 20, and 21—The Silver Medal.

- No. 205 The late Lady Currie of Garth, Balnacraig, Fortingall.

CLASS 19. BULL, calved before 1919.—Premiums, £15, £10, £5, and £3.

- 1st No. 197 Peter M'Intyre, Tighnablaair, Comrie, Perthshire, "An Gille Feumail" (2871).
 2nd No. 196 Miss Grace Macalister Hall, Tangy, Kilkenzie, Kintyre, Campbeltown, "Ridhire of Garth" (3011).

CLASS 20. BULL, calved in 1919.—Premiums, £15, £10, £5, and £3.

- 1st No. 198 The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Ossian Ban of Atholl."
 2nd No. 199 Mrs Maze of Achnacloich, Connel, Argyll, "Culnadalloch General."
 3rd No. 201 D. A. Stewart, Lochdhu, Nairn, "Uachdaran."
 4th No. 200 Lady Ogilvy-Dalgleish of Errol, Errol Park, Errol, Perthshire, "Coruisk of Errol."

CLASS 21. BULL, calved in 1920.—Premiums, £12, £8, £4, and £2,

- 1st No. 205 John F. Christie, Netherton, Balfron, Stirlingshire, "Ceatharnach a Rithist of Garth."
 2nd No. 211 D. A. Stewart, Lochdhu, Nairn, "Eachann of Ensaq."
 3rd No. 208 A. K. M'Douall, Logan, Stranraer, "Carrick Prince James of Logan."
 4th No. 212 John Stewart, Bochastle, Callander, "Ailpein of Bochastle."
 V No. 209 Mrs Maze of Achnacloich, Connel, Argyll, "Marquis of Achnacloich."
 H No. 207 Miss Grace Macalister Hall, Tangy, Kilkenzie, Kintyre, Campbeltown, "Donnacha Coir of Tangy."
 C No. 203 James Carnegie, Stronvar, Balquhadder, Perthshire, "Seumas of Stronvar."

Perpetual Victory Challenge Cup, approximate value 35 Guineas, *for the best Animal in the Female Classes, "Extra Stock" being eligible to compete*—given by the Highland Cattle Society of Scotland.

- No. 236 The Earl of Southesk, Kinnaird Castle, Brechin, "Caroline II."

CLASS 22. COW, of any age, in Milk.—Premiums, £12, £8, £4, and £2.

- 1st No. 222 John Stewart, Bochastle, Callander, "Bhuidhe Bhoidheach V."
 2nd No. 214 The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Donnag Riabhach XII. of Atholl" (8780).
 3rd No. 221 The Earl of Southesk, Kinnaird Castle, Brechin, "Sidonia IV."
 4th No. 216 The Marquis of Graham, C.B., Brodick Castle, Isle of Arran, "Proiseag Ruadh IV."
 V No. 215 John F. Christie, Netherton, Balfron, Stirlingshire, "Ban Righ of Castle Grant" (8380).
 H No. 219 Lady Ogilvy-Dalgleish of Errol, Errol Park, Errol, Perthshire, "Fiona II. of Errol."
 C No. 218 Lady Ogilvy Dalgleish of Errol, Errol Park, Errol, Perthshire, "Almira II. of Errol."

CLASS 23. HEIFER, calved in 1918.—Premiums, £10, £5, £3, and £2.

- 1st No. 236 The Earl of Southesk, Kinnaird Castle, Brechin, "Caroline II."
 2nd No. 229 The Marquis of Graham, C.B., Brodick Castle, Isle of Arran, "Proiseag Sgiathach III."
 3rd No. 223 The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Bean Bhan IX. of Atholl."
 4th No. 235 The Earl of Southesk, Kinnaird Castle, Brechin, "Corrina IV."
 V No. 233 W. Dalziel Mackenzie of Farr, Farr Mains, Inverness, "Dileas."
 H No. 232 W. Dalziel Mackenzie of Farr, Farr Mains, Inverness, "Mona of Farr."
 C No. 230 A.K.M'Douall, Logan, Stranraer, "Carrick Valona of Logan."

CLASS 24. HEIFER, calved in 1919.—Premiums, £10, £5, £3, and £2.

- 1st No. 241 John F. Christie, Netherton, Balfron, Stirlingshire, "Ban-Righ II. of Garth."
 2nd No. 246 The Earl of Southesk, Kinnaird Castle, Brechin, "Corona II."
 3rd No. 242 The Marquis of Graham, C.B., Brodick Castle, Isle of Arran, "Proiseag Sgiathach IV. of Garth."
 4th No. 243 James Macalister Hall of Killean, Killean, Tayinloan, Argyllshire, "Tangy Og of Killearn (Tangy Og)."
 V No. 245 W. Dalziel Mackenzie of Farr, Farr Mains, Inverness, "Una of Farr."
 H No. 247 D. A. Stewart, Lochdhu, Nairn, "Laochag Silvio."
 C No. 238 The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Annag Ruadh II. of Atholl."

AYRSHIRE.

PRESIDENT'S CHAMPION MEDAL for best Ayrshire.

- No. 254 Adam W. Montgomerie, Lessnessock, Ochiltree, "Lochdougan Princess 3rd" (A6372).

Special Prize of £10 for the best Female Animal of the Ayrshire breed entered with a number in the Ayrshire Cattle Herd-Book not later than 1st June 1921—given by the Ayrshire Cattle Herd-Book Society.

- No. 270 James Mackie, Relief, Ecclefechan, "Dalfibble Grace Darling II." (38,980).

CLASS 25. COW in Milk, calved before 1918.—Premiums, £12, £8, and £4.

- 1st No. 254 Adam W. Montgomerie, Lessnessock, Ochiltree, "Lochdougan Princess 3rd" (A6372).
 2nd No. 255 Jacob S. Murray, Dalgig, New Cumnock, "Carston Rhoda" (52,271).
 3rd No. 248 A. Y. Allan, Aitkenbar, Dumbarton, "Aitkenbar Vera" (69,894).
 V No. 264 William Hodge, Slodahill, Lockerbie, "Heithat Tibbie 2nd."
 H No. 252 William L. Ferguson, Catlinns, Lockerbie, "Catlinns Princess Alice" (51,043).
 C No. 249 R. L. Angus, Ladykirk, Monkton, Ayrshire, "Torcross Sally" (60,291).

CLASS 26. COW in Milk, calved after 1st January 1918.—Premiums, £10, £7, and £3.

- 1st No. 259 Sir Hugh Shaw Stewart, Bart., C.B., Ardgowan, Inverkip, "Ardgowan Amazon" (63,443).
 2nd No. 258 Mungo Sloan, Douglas Hall, Ecclefechan, "Douglas Hall Roseleaf 2nd."
 3rd No. 257 Mrs M'Alister, Meikle Kilmory, Rothesay, "Meikle Kilmory Lady Bute 6th" (64,293).

CLASS 27. COW of any age, in Calf, or HEIFER, calved in 1918, in Calf, and due to calve within nine months after the Show.—Premiums, £10, £7, and £3.

- 1st No. 270 James Mackie, Relief, Ecclefechan, "Dalfibble Grace Darling II." (38,980).
 2nd No. 261 William L. Ferguson, Catlinns, Lockerbie, "Catlinns Miss Baird."

- 3rd No. 266 Mrs Houson-Craufurd, Dunlop House, Dunlop, Ayrshire,
"Hobsland Mary VII." (37,823).
V No. 260 A. Y. Allan, Aitkenbar, Dumbarton, "Harperland Jewel"
(47,882).
H No. 271 Mungo Sloan, Douglas Hall, Ecclefechan, "Douglas Hall
Fairy Fanny" (62,032).
C No. 265 Mrs E. L. Houson-Craufurd, Dunlop House, Dunlop,
"Dunlop Treasure" (51,309).

CLASS 28. HEIFER, calved in 1919.—Premiums, £10, £5, and £3.

- 1st No. 280 Major Henry Keswick, Cowhill Tower, Dumfries, "Jenny."
2nd No. 274 Alexander Cochrane, Nethercraig, Kilmarnock, "Nether-
craig Heath Flower" (56,977).
3rd No. 281 John Logan, Bargenoch, Drongan, "Bargenoch Minerva"
(57,404).
V No. 278 Mrs Houson-Craufurd, Dunlop House, Dunlop, Ayrshire,
"Dunlop Flummery" (64,157).
H No. 273 Sir Thomas Clement, K.B.E., Netherton, Newton Mearns,
"Benston Mysie 6th" (57,237).
C No. 275 Hon. G. Corbett, Rowallan, Kilmarnock, "Rowallan Mint."

CLASS 29. HEIFER, calved in 1920.—Premiums, £8, £5, and £3.

- 1st No. 290 Thomas Logan, Low Milton, Maybole, "Low Milton Miss
Thomson" (68,524).
2nd No. 284 Sir Thomas Clement, K.B.E., Netherton, Newton Mearns,
"Netherton Queen Greenfield 4th" (67,971).
3rd No. 287 Hon. G. Corbett, Rowallan, Kilmarnock, "Howie's Likely
Maid" (69,350).
V No. 285 Sir Thomas Clement, K.B.E., Netherton, Newton Mearns,
"Netherton Rosetta 2nd" (67,973).
H No. 291 Thomas Logan, Low Milton, Maybole, "Low Milton Grand
Bloom" (68,517).
C No. 288 Hon. G. Corbett, Rowallan, Kilmarnock, "Hobsland Jean
6th" (67,986).

Special Prize of £10 for the best Male Animal of the Ayrshire breed entered
with a number in the Ayrshire Cattle Herd-Book not later than 1st June
1921—given by the Ayrshire Cattle Herd-Book Society.

- No. 297 Thomas Logan, Low Milton, Maybole, "Bargenoch Right at
Last" (17,295).

Breeder of the best Bull of any age in Classes 30, 31, and 32—The Silver Medal.

- No. 297 John Logan, Bargenoch, Drongan.

CLASS 30. BULL, calved before 1919.—Premiums, £12, £8, and £4.

- 1st No. 297 Thomas Logan, Low Milton, Maybole, "Bargenoch Right
at Last" (17,295).
2nd No. 294 Mrs Houson-Craufurd, Dunlop House, Dunlop, Ayrshire,
"Howie's Hot Stuff" (17,895).
3rd No. 296 A. Fingland Jack, Stocksfield Hall Farm, Stocksfield-on-
Tyne, "Kirkland Clockwork" (17,898).
V No. 299 Robert Marshall, The Mains of Kilmarnock, by Alexandria,
"Kirkland Dominion."
H No. 298 Robert Marshall, The Mains of Kilmarnock, by Alexandria,
"Cawhillan Flashlight" (18,197).
C No. 300 Adam W. Montgomerie, Lessnessock, Ochiltree, "Bargenoch
Royal Champion" (17,290).

CLASS 31. BULL, calved in 1919.—Premiums, £10, £7, and £3.

- 1st No. 301 Hon. G. Corbett, Rowallan, Kilmarnock, "Hobsland Mindie" (18,422).
 2nd No. 303 Major H. Keswick, Cowhill Tower, Dumfries, "Drumsine Royal Guard" (18,631).

CLASS 32. BULL, calved in 1920.—Premiums, £8, £5, and £3.

- 1st No. 310 D. & W. Wallace, Auchenbrain, Mauchline, "South Craig Footprint" (19,958).
 2nd No. 308 John Logan, Bargenoch, Drongan, "Bargenoch Standard-Bearer" (19,758).
 3rd No. 305 Sir Thomas Clement, K.B.E., Netherpton, Newton Mearns, "Bargenoch Gallant Knight" (19,754).
 V No. 306 Alexander Cochrane, Nethercraig, Kilmarnock, "Sandhill Premium Bond" (19,771).
 H No. 309 Sir Hugh Shaw Stewart, Bart., C.B., Ardgowan, Inverkip, "Ardgowan No Fear."
 C No. 304 A. Y. Allan, Aitkenbar, Dumbarton, "Hobsland Tophole" (19,610).

MILK RECORD CLASS.

CLASS 33. BULL, any age, the progeny of an Ayrshire Cow having an authenticated milk yield.—Premiums, £15, £10, and £5—Given by the Board of Agriculture for Scotland.

- 1st No. 294 Mrs Housion-Craufurd, Dunlop House, Dunlop, Ayrshire, "Howie's Hot Stuff" (17,895).
 2nd No. 310 D. & W. Wallace, Auchenbrain, Mauchline, "South Craig Footprint" (19,958).
 3rd No. 296 A. Fingland Jack, Stocksfield Hall Farm, Stocksfield-on-Tyne, "Kirkland Clockwork" (17,898).
 V No. 308 John Logan, Bargenoch, Drongan, "Bargenoch Standard-Bearer" (19,758).

BRITISH FRIESIAN.

PRESIDENT'S CHAMPION MEDAL for best British Friesian Animal.

- No. 343 Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Lochlands Pel Naspa" (40,376).

Silver Bowl, value £25, for the three best animals in the British Friesian Classes got by the same sire, and exhibited by, but not necessarily bred by, one exhibitor—given by Mr Adam Smith, Lochlands, Larbert.

- Nos. 336, 351, 350 William Sinclair, Loirston, by Aberdeen.

Champion Prize of £5, given by the British Friesian Cattle Society for the best Male exhibited.

- No. 312 The Marquis of Bute, Mount Stuart, Rothesay, "Tarvin Pel Klaas II." (10,701).

CLASS 34. BULL, calved in or before 1918.—Premiums, £10, £5, and £3.

- 1st No. 312 The Marquis of Bute, Mount Stuart, Rothesay, "Tarvin Pel Klaas II." (10,701).
 2nd No. 313 Hamilton Brothers, Kessington, Bearsden, "Terling Donovan" (8805).
 3rd No. 311 James Adam, Meadowend, Clackmannan, "Dunninald Heeringahad" (7719).
 C No. 315 William Meiklem, Begg, Kirkcaldy, "Terling Talisman" (10,711).

CLASS 35. BULL, calved in 1919.—Premiums, £10, £5, and £3.

- 1st No. 319 Captain John Stirling, Fairburn, Muir of Ord, "Seaton Emperor" (12,685).
 2nd No. 318 Miss Marjorie Henderson, The Riding, Hexham-on-Tyne, Northumberland, "Longslow Oak" (12,187).

CLASS 36. BULL, calved in 1920.—Premiums, £10, £5, and £3.

- 1st No. 320 Hamilton Brothers, Kessington, Bearsden, "Kilbride Ajorhogg."
 2nd No. 321 Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Douneside Hatsumerschaap" (P.I.)
 3rd No. 323 Captain John Stirling, Fairburn, Muir of Ord, "Fairburn Spion Kop."
 G No. 322 Alexander Paul, Almada Street, Hamilton, "Lochlands Hugo."

Champion Prize of £5 given by the British Friesian Cattle Society *for the best Female exhibited.*

- No. 343 Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Lochlands Pel Naspa" (40,376).

CLASS 37. COW in Milk, calved in or before 1917.—Premiums, £10, £5, and £3.

- 1st No. 333 Adam Smith, Lochlands, Larbert, Stirlingshire, "Lochlands Molly" (25,512).
 2nd No. 328 Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Lochlands Noreen" (25,516).
 3rd No. 324 G. A. Francis, West Seaton, Arbroath, "Seaton Bounty" (26,488).
 H No. 326 Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Lochlands Mousme" (10,012).
 C No. 325 James Kilpatrick, Craigie Mains, Kilmarnock, "Colton Buttercup 2nd" (17,260).

CLASS 38. HEIFER in Milk, calved in 1918 or 1919.—Premiums, £10, £5, and £3.

- 1st No. 336 William Sinclair, Loirston, by Aberdeen, "Kirkhill Nellie 7th" (34,296).
 2nd No. 334 Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Lochlands Molly Mine" (34,616).
 3rd No. 337 William Sinclair, Loirston, by Aberdeen, "Kirkhill Clover 3rd" (34,284).

CLASS 39. HEIFER in Calf, with her first calf to calve before 3 years old.—Premiums, £10, £5, and £3.

- 1st No. 343 Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Lochlands Pel Naspa" (40,376).
 2nd No. 351 William Sinclair, Loirston, by Aberdeen, "Kirkhill Nellie 8th" (34,298).
 3rd No. 350 William Sinclair, Loirston, by Aberdeen, "Kirkhill Lucy 4th" (39,968).
 V No. 340 The Marquis of Bute, Mount Stuart, Rothesay, "Bute Lady Mary" (37,646).
 H No. 342 William Hay, Woodside, Portknockie, "Broadholm Loreen" (32,178).
 C No. 344 David Mitchell, Wamphray, North Berwick, "Berwick Rose" (37,198).

CLASS 40. HEIFER, calved in 1920.—Premiums, £10, £5, and £3.

- 1st No. 366 Adam Smith, Lochlands, Larbert, Stirlingshire, "Lochlands Maris."
 2nd No. 362 Trustees of Alasdair W. M'Robert, Douneside, Tarland, "Seaton Fairy."
 3rd No. 363 Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Seaton Forget-me-Not."
 V No. 357 G. A. Francis, West Seaton, Arbroath, "Seaton Bounty Twin 2nd"
 H No. 358 G. A. Francis, West Seaton, Arbroath, "Seaton Bounty Twin 1st"
 C No. 359 G. A. Francis, West Seaton Arbroath, "Seaton Johanna 2nd" (P.I.)

HORSES.**FOR AGRICULTURAL PURPOSES.****DRAUGHT STALLIONS.****PRESIDENT'S CHAMPION MEDAL for best Clydesdale Stallion or Colt.**

- No. 382 Andrew M. Montgomery, of Nether Hall, Castle Douglas, "Fyvie Sensation" (20,042).

Paisley Perpetual Gold Challenge Cup, value £300, for best Clydesdale Stallion or Colt, "Extra Stock" being eligible to compete. This Cup, along with an endowment of £600, was provided from money collected in Paisley by the late Provost Muir MacKean, and is in commemoration of the Society's first Show at Paisley in 1913.

- No. 382 Andrew M. Montgomery of Nether Hall, Castle Douglas, "Fyvie Sensation" (20,042).

Breeder of best Male Animal of any age in Classes 41, 42, 43, and 44—
 The Silver Medal.

- No. 382 J. & P. Donald, Lethen, Fyvie.

CLASS 41. STALLION, foaled before 1918.—
 Premiums, £20, £15, £10, and £4.

- 1st No. 372 John Pollock, Byres Farm, Pollokshaws, "Dandaleith Quest" (19,082).
 2nd No. 369 George A. Ferguson, Northern Stud, Elgin, "Ardendale" (18,993).
 3rd No. 367 George Alston, Loudounhill, Darvel, "The Ally" (19,291).
 4th No. 368 George Bean, West Balloch, Montrose, "Royal Footprint" (19,539).

CLASS 42. ENTIRE COLT, foaled in 1918.—
 Premiums, £20, £15, £10, and £4.

- 1st No. 382 Andrew M. Montgomery of Nether Hall, Castle Douglas, "Fyvie Sensation" (20,042).
 2nd No. 385 John Pollock, Byres Farm, Pollokshaws, "Lawmuir" (20,090).
 3rd No. 384 Allan A. Morton, Bencloich Farm, Lennoxton, "Bencloich" (20,248).

- 4th No. 381 Andrew M. Montgomery of Nether Hall, Castle Douglas,
"Dunure Substance" (20,015).
V No. 376 George A. Ferguson, Northern Stud, Elgin, "Premierdale"
(20,140).
H No. 377 George A. Ferguson, Northern Stud, Elgin, "Auchencraig"
(Vol. 43).
C No. 378 James Gray, Birkenwood, Kippen Station, "Risgue"
(20,158).
C No. 387 A. M. Simpson, Whitecross, East Kilbride, "High Principal"
(20,366).

William Taylor Memorial Prize of £10 and Certificate to the Breeder of the best Clydesdale Colt entered in Classes 43 or 44—given by William Taylor Memorial Committee.

- No. 394 James Gray, Birkenwood, Kippen Station, "Vim" (Vol. 44).

CLASS 43. ENTIRE COLT, foaled in 1919.—
Premiums, £20, £15, £10, and £4.

- 1st No. 394 James Gray, Birkenwood, Kippen Station, "Vim" (Vol. 44).
2nd No. 396 John Johnston, Carbrookmains, Larbert, "Demonstrator"
(Vol. 44).
3rd No. 391 Walter A. Aitkenhead, Haining Valley, Linlithgow, "Front
Line" (20,346).
4th No. 393 George A. Ferguson, Northern Stud, Elgin, "Silverdale"
(20,452).
V No. 405 Walter Robertson, Auchinlech Farm, Duntocher, "Auchin-
lech Impression" (Vol. 44).
H No. 407 F. L. Wallace of Balcairn, Oldmeldrum, Aberdeenshire,
"Balcairn Warrior."
C No. 402 John Pollock, Byres Farm, Pollokshaws, "Prolific" (20,419).
C No. 404 R. Rattray, Parkconon, Arbroath, "Royal Arden" (20,432).

CLASS 44. ENTIRE COLT, foaled in 1920.—
Premiums, £15, £10, £6, and £4.

- 1st No. 419 Albert James Marshall, Craggleton, Garlieston.
2nd No. 412 George A. Ferguson, Northern Stud, Elgin, "Merridale."
3rd No. 409 James Clark, Netherlea Farm, Cathcart, "Kerrston."
4th No. 414 John Johnston, Carbrookmains, Larbert, "Dunmore."
V No. 421 Robert Park, Brunstane, Portobello.
H No. 416 James Kilpatrick, Craigie Mains, Kilmarnock.
C No. 411 George A. Ferguson, Northern Stud, Elgin, "Flashdale."

DRAUGHT GELDINGS.

PRESIDENT'S CHAMPION MEDAL for best Draught Gelding.

- No. 430 Scottish Co-operative Wholesale Society, Ltd., 95 Morrison
Street, Glasgow, "Top Line."

CLASS 45. DRAUGHT GELDING, foaled before 1918.—
Premiums, £10, £5, and £3.

- 1st No. 430 Scottish Co-operative Wholesale Society, Ltd., 95 Morrison
Street, Glasgow, "Top Line."
2nd No. 425 William S. Miller of Balmanno Castle, Bridge of Earn,
Perthshire, "Billy."
3rd No. 428 Robert Pettigrew, Millerwood, Airdrie, "Wullie Wyllie."
V No. 426 James Mitchell, Bonnington, North Berwick, "Tractor."
H No. 423 J. Belfrage Black, Tillywhally, Milnathort, "Charlie."
C No. 429 John W. Prentice, Craigie Farm, Clackmannan, "Duglas."

CLASS 46. DRAUGHT GELDING, foaled in 1918.—Premiums, £6, £4, and £3.

- 1st No. 432 James Clark, Netherlea Farm, Cathcart, "Jim."
 2nd No. 438 Scottish Co-operative Wholesale Society, Ltd., 95 Morrison Street, Glasgow, "Johnny."
 3rd No. 435 William S. Miller of Balmanno Castle, Bridge of Earn, Perthshire, "Farmer."
 V No. 440 James Walker, Lornshill, Alloa, "Willie Kerr."
 H No. 436 Douglas D. Murray, The Dene, Seaham Harbour, "Pat."
 C No. 437 John W. Prentice, Craigie Farm, Clackmannan, "Jim."

CLASS 47. DRAUGHT GELDING, foaled in 1919.—Premiums, £6, £4, and £3.

- 1st No. 444 William Howie, Potato Merchant, Greenock, "Hugo."
 2nd No. 451 Scottish Co-operative Wholesale Society, Ltd., 95 Morrison Street, Glasgow, "Jim."
 3rd No. 450 William S. Miller of Balmanno Castle, Bridge of Earn, Perthshire, "Jock."
 V No. 441 Allan Clark, Woodbank, Windygates, "Woodbank."
 H No. 449 William Meiklem, Begg, Kirkcaldy, "Bob."
 C No. 442 James Fleming, Barns of Claverhouse, Dundee, "Nelson."

DRAUGHT MARES AND FILLIES.

PRESIDENT'S CHAMPION MEDAL for best Clydesdale Mare or Filly.

- No. 452 William Brown, Craigton, Bishopton, "Farleton Lady Alice" (47,512).

Best Clydesdale Mare or Filly registered in the Clydesdale Stud-Book—Cawdor Challenge Cup, value 50 guineas, given by the Clydesdale Horse Society.

- No. 452 William Brown, Craigton, Bishopton, "Farleton Lady Alice" (47,512).

CLASS 48. MARE of any age, with foal at foot.—Premiums, £20, £12, £7, and £4.

- 1st No. 452 William Brown, Craigton, Bishopton, "Farleton Lady Alice" (47,512).
 2nd No. 456 John P. Sleigh of St John's Wells, Fyvie, "Blackwood Dawn."
 3rd No. 455 John Johnston, Carbrookmains, Larbert, "Beryl."
 4th No. 457 E. G. Thomson, Callands, West Linton, "Callands Gaiety."

CLASS 49. YELD MARE, foaled before 1918.—Premiums, £12, £9, £6, and £4.

- 1st No. 465 John P. Sleigh of St John's Wells, Fyvie, "Wells Lady Ray" (44,060).
 2nd No. 461 George A. Ferguson, Northern Stud, Elgin, "Farleton Jean."
 3rd No. 460 James Dickie, Kelton House, Dumfries, "Nyasa Queen."
 4th No. 464 William Meiklem, Begg, Kirkcaldy, "Maud" (50,902).
 V No. 458 George Bean, West Balloch, Montrose, "Queen Juana."
 H No. 459 J. Belfrage Black, Tillywhally, Milnathort, "Dunure Voice" (38,671).
 C No. 462 George Graham, Faraway Farm, Kippen Station, "Faraway Rosebud."

CLASS 50. YELD MARE or FILLY, foaled in 1918.—
 Premiums, £12, £9, £6, and £4.

- 1st No. 472 Douglas D. Murray, The Dene, Seaham Harbour, Filly, "Seaham Destiny."
 2nd No. 470 J. E. Kerr of Harviestoun, Dollar, Filly, "Harviestoun Felicia."
 3rd No. 473 Alexander Niven, Collairnie, Ladybank, Filly, "Destiny."
 4th No. 467 James Gray, Birkenwood, Kippen Station, Filly, "Elsie."
 V No. 466 William F. Baxter, North Hainings, Bo'ness, Filly, "Roseprint."
 H No. 474 Alexander Niven, Collairnie, Ladybank, Filly, "Lady Dundurn."
 C No. 477 William J. Reid, Fordhouse of Dun, Montrose, Filly, "Boquhan Penelope."
 C No. 481 George Stewart, Drum Farm, Bo'ness, Mare, "Farleton Patricia."

CLASS 51. FILLY, foaled in 1919.—Premiums, £12, £9, £6, and £4.

- 1st No. 497 John P. Sleigh of St John's Wells, Fyvie, "Wells Mescal."
 2nd No. 500 F. L. Wallace, of Balcairn, Old Meldrum, "Dunure Syrene."
 3rd No. 489 J. E. Kerr of Harviestoun, Dollar, "Harviestoun Princess."
 4th No. 494 The Duke of Portland, Berriedale, Caithness, "Lady Litigant."
 V No. 499 Thomas Sloan, Fountainbleau, Dumfries, "Lady Paterson."
 H No. 491 Robert Marshall, The Mains of Kilmaronock, by Alexandria, "Farleton Harmony."
 C No. 488 J. E. Kerr of Harviestoun, Dollar, "Harviestoun Fairy."
 C No. 492 Robert Marshall, The Mains of Kilmaronock, by Alexandria, "Parkhall Perfect Lady."

CLASS 52. FILLY, foaled in 1920.—Premiums, £12, £9, £6, and £4.

- 1st No. 514 Alexander Murdoch, East Hallside, Hallside, Lanarkshire, "Ophelia."
 2nd No. 516 H. E. Roberts, Monk Castle, Southwaite, Carlisle, "Monk Gladys."
 3rd No. 515 The Duke of Portland, Berriedale, Caithness, "Portia."
 4th No. 518 John P. Sleigh of St John's Wells, Fyvie, "Musa."
 V No. 522 William Taylor, Inveravon Farm, Polmont, "Tama."
 H No. 511 James Kilpatrick, Craigie Mains, Kilmarnock, "Craigie Fair Maid."
 C No. 502 Walter A. Aitkenhead, Haining Valley, Linlithgow.
 C No. 517 John P. Sleigh of St John's Wells, Fyvie, "Mira."
 C No. 519 John P. Sleigh of St John's Wells, Fyvie, "Raysun."

HUNTERS.

PRESIDENT'S CHAMPION MEDAL for best Hunter.

- No. 533 Moffat S. Thomson, Spotsmains, Kelso, Gelding, "Cheerio."

CLASS 53. HUNTER BROOD MARE, with Foal at foot.—
 Premiums, £15, £7, and £3.

- 1st No. 524 Moffat S. Thomson, Spotsmains, Kelso, "Nanita."

Best Hunter Filly, not exceeding three years old, registered with a number in the Hunter Stud-Book, or the entry tendered within a month of the award—Champion Gold Medal, given by the Hunters' Improvement and National Light Horse Breeding Society.

No. 536 Moffat S. Thomson, Spotsmains, Kelso.

CLASS 54. YELD MARE, FILLY, or GELDING, for field, foaled in 1918—in hand.—Premiums, £10, £5, and £3.

1st No. 526 Miss Thomson Currie, Carpow, Newburgh, Fife, Filly, "Meg Merrilees."

2nd No. 525 John R. Beattie, Baurch Farm, Rigg of Gretna, Gelding, "Courtier."

3rd No. 528 M'Nab, Andrew, Midton House, Howwood, Renfrewshire, Filly, "Kara."

CLASS 55. YELD MARE, FILLY, or GELDING, for field, foaled in 1919—in hand.—Premiums, £10, £5, and £3.

1st No. 533 Moffat S. Thomson, Spotsmains, Kelso, Gelding, "Cheerio."

2nd No. 529 John R. Beattie, Baurch Farm, Rigg of Gretna, Gelding, "Comical."

3rd No. 532 Moffat S. Thomson, Spotsmains, Kelso, Gelding, "The Rake."

CLASS 56. COLT, GELDING, or FILLY, foaled in 1920, the produce of thoroughbred Stallion or registered Hunter sire, out of Mare of any breed.—Premiums, £10, £5, and £3.

1st No. 536 Moffat S. Thomson, Spotsmains, Kelso, Filly.

2nd No. 534 Alexander Binnie, Woodside, Crossford, Carluke, Filly, "Woodside Lady."

HACKNEYS.

(ALL SHOWN IN HAND.)

PRESIDENT'S CHAMPION MEDAL for best Hackney in Classes 57 to 61.

No. 537 Enoch Glen, Kaim Park, Bathgate, "Flash Clara" (19,087).

Champion Prize of £10 offered by the Hackney Horse Society for best Mare or Filly in Hackney or Pony Classes, animals entered as "Extra Stock" being eligible.

No. 537 Enoch Glen, Kaim Park, Bathgate, "Flash Clara" (19,087).

CLASS 57. BROOD MARE, over 14 Hands, with Foal at foot, or to foal this season to a registered Sire. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1st No. 537 Enoch Glen, Kaim Park, Bathgate, "Flash Clara" (19,087).

2nd No. 539 Robert Wolfe, Wellpark, Bathgate, "Adbolton Wonderful" (24,419).

CLASS 58. YELD MARE or FILLY, foaled in 1918. Registered in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1st No. 541 Enoch Glen, Kaim Park, Bathgate, Mare, "Preston Mavis" (24,785).

CLASS 59. ENTIRE COLT or FILLY, foaled in 1919. Registered in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1st No. 542 Enoch Glen, Kaim Park, Bathgate, Colt, "Glenavon Butler" (13,697).

CLASS 60. ENTIRE COLT or FILLY, foaled in 1920. Eligible for Entry in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1st No. 544 Enoch Glen, Kaim Park, Bathgate, Colt, "Glenavon Fashion."

2nd No. 543 Peter Ballantyne, 25 Ailsa Drive, Langside, Glasgow, Colt.

3rd No. 545 Robert Waddell, Bridge Street, Dollar, Filly.

CLASS 61. STALLION, foaled in or before 1918, over 14 Hands. Registered in the Hackey Stud-Book.—Premiums, £10, £6, and £4.

(Not forward.)

PONIES.

PRESIDENT'S CHAMPION MEDAL for best Pony.

No. 552 William S. Miller of Balmanno Castle, Bridge of Earn, Mare, "Kitty Melbourne" (20,795).

CLASS 62. STALLION, 3 years old and upwards, 14 Hands and under—in hand.—Premiums, £5, £3, and £2.

1st No. 547 J. E. Kerr of Harviestoun, Dollar, "Harviestoun Scottie" (13,454).

CLASS 63. YELD MARE, FILLY, or GELDING, 3 years old and upwards, over 13 and not over 14 Hands—in saddle.—Premiums, £5, £3, and £2.

1st No. 552 William S. Miller of Balmanno Castle, Bridge of Earn, Mare, "Kitty Melbourne." (20,795).

2nd No. 549 Chassells Bros., Muirhouses, Motherwell, Mare, "Miss Bell."

3rd No. 548 Peter Ballantyne, 25 Ailsa Drive, Langside, Glasgow, Gelding.

H No. 551 J. E. Kerr of Harviestoun, Dollar, Filly, "Harviestoun Vera" (24,965).

C No. 553 J. M. Sanderson, Drumbrae, Bridge of Allan, Mare, "Minnie."

CLASS 64. YELD MARE, FILLY, or GELDING, 3 years old and upwards, not over 13 Hands—in saddle.—Premiums, £5, £3, and £2.

(Not forward.)

HIGHLAND PONIES.

PRESIDENT'S CHAMPION MEDAL for best Highland Pony.

No. 557 Kenneth L. Macdonald, Tote, Portree, Isle of Skye, "Glenmore."

Special Prize of £15 for the best Highland or Western Island Stallion, Mare, Colt, or Filly, entered or accepted for entry in the Highland Section of the National Pony Stud-Book, "Extra Stock" being eligible to compete. Given by the National Pony Society.

No. 557 Kenneth L. Macdonald, Tote, Portree, Isle of Skye, "Glenmore."

CLASS 65. STALLION, 3 years old or upwards, not exceeding 14.2 Hands.
—Premiums, £8, £4, and £2.

- 1st No. 557 Kenneth^L. Macdonald, Tote, Portree, Isle of Skye, "Glenmore."
2nd No. 556 The Duke of Atholl, K.T., Blair Castle, Blair-Atholl,
"Fender Laddie" (977).

EXTRA STOCK.

The following was Very Highly Commended, and a Silver Medal awarded :—

- No. 558 The Marquis of Graham, C.B., Brodick Castle, Isle of Arran,
"Glen Bernesdale" (891).

The following was Very Highly Commended, and a Silver Medal awarded :—

- No. 555 The Earl of Ancaster, Glenartney Forest, Comrie, Perthshire,
"Ronald II." (887).

CLASS 66. MARE, 3 years old or upwards, not exceeding 14.2 Hands,
Yeld or with Foal at foot.—Premiums, £8, £4, and £2.

- 1st No. 559 The Duke of Atholl, K.T., Blair Castle, Blair-Atholl,
"Minnie of Atholl" (3072).
2nd No. 562 James M. Cairns, Ollaberry House, Blackford, Perthshire,
"Isla Ormiston" (4041).
3rd No. 566 Donald MacKelvie, New Lanark, Lamlash, "Kilbride."
V No. 570 Norman J. Nasmyth of Glenfarg, Abernethy, "Sheila of
Coulshill" (3463).
H No. 568 Sir John Stirling Maxwell, Bart., of Pollok, Pollokshaws,
"Mairi Ileach" (3124).
C No. 561 Board of Agriculture for Scotland, Beechwood, Inverness,
"May Dew" (2836).

The following was Highly Commended, and a Medium Silver Medal
awarded :—

- No. 572 Alexander Cowan of Loganhouse, Penicuik, "Calliach
Bhan II." (2308).

CLASS 67. ENTIRE COLT, foaled after 1st January 1919.
—Premiums, £6, £4, and £2.

- 1st No. 573 The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Ben
Odhar."
2nd No. 574 James Carnegie, Stronvar, Balquhiddy, Perthshire, "Haig."

CLASS 68. FILLY, foaled after 1st January 1919.
—Premiums, £6, £4, and £2.

- 1st No. 580 Norman J. Nasmyth of Glenfarg, Abernethy, "Morag of
Glenfarg."
2nd No. 576 James M. Cairns, Ollaberry House, Blackford, Perthshire,
"Calliach Bhan V."
3rd No. 578 The Marquis of Graham, C.B., Brodick Castle, Isle of Arran,
"Isle of Arran Bonnie Jean."
V No. 579 The Marquis of Graham, C.B., Brodick Castle, Isle of Arran,
"Isle of Arran Sheen."

WESTERN ISLAND PONIES.

PRESIDENT'S CHAMPION MEDAL for best Western Island Pony.

No. 592 Allan J. Bowie, Thrushcraig, Paisley, "Lord of the Isles" (999).

CLASS 69. STALLION, 3 years old or upwards, not exceeding 14.2 Hands.
—Premiums, £8, £4, and £2.

1st No. 583 Duncan MacLeod, of Skeabost, Portree, Isle of Skye.

2nd No. 582 J. H. Munro Mackenzie of Calgary, Isle of Mull, "Kilmore."

CLASS 70. MARE, 3 years old or upwards, not exceeding 14.2 Hands,
Yeld or with Foal at foot.—Premiums, £8, £4, and £2.

1st No. 590 Charles D. M. Ross, The Ibert, Crieff, "Princess."

2nd No. 584 The Earl of Ancaster, Glenartney Forest, Comrie, Perthshire,
"Sheila of Coulshill" (3480).

3rd No. 585 James M. Cairns, Ollaberry House, Blackford, Perthshire,
"Glenerrichty" (4042).

H No. 587 Miss H. M. Duguid, Manar, Inverurie, "Moal Mohr" (3458).

C No. 589 J. H. Munro Mackenzie of Calgary, Isle of Mull, "Moisgeir"
(3064).

CLASS 71. ENTIRE COLT, foaled after 1st January 1919.—
Premiums, £6, £4, and £2.

1st No. 592 Allan J. Bowie, Thrushcraig, Paisley, "Lord of the Isles"
(999).

2nd No. 594 Charles D. M. Ross, The Ibert, Crieff, "Morenish."

3rd No. 593 J. H. Munro Mackenzie of Calgary, Isle of Mull, "Duart."

CLASS 72. FILLY, foaled after 1st January 1919.—
Premiums, £6, £4, and £2.

1st No. 595 The Marquis of Graham, C.B., Brodick Castle, Isle of Arran,
"Isle of Arran Flora."

2nd No. 596 J. H. Munro Mackenzie of Calgary, Isle of Mull, "Lanishker."

SHETLAND PONIES.

(ALL SHOWN IN HAND.)

PRESIDENT'S CHAMPION MEDAL for best Shetland Pony.

No. 621 Mrs Etta Duffus, Penniwells, Elstree, Herts, "May Queen of
Penniwells" (3348).

*Silver Medal for the best Shetland Pony of the sex opposite to that of the winner
of the President's Medal, entered or eligible for entry in the Shetland
Pony Stud-Book—given by the Shetland Pony Stud-Book Society.*

No. 597 Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow,
"Phœbus of Auchlochan" (777).

CLASS 73. STALLION, not exceeding 10½ Hands, foaled before 1918.
—Premiums, £8, £5, £3, and £2.

1st No. 597 Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow,
"Phœbus of Auchlochan" (777).

2nd No. 598 Mrs Etta Duffus, Penniwells, Elstree, Herts, "Vagary of
Penniwells" (841).

- 3rd No. 601 R. W. R. Mackenzie, Earls hall, Leuchars, "Whynot of Earls hall" (898).
 4th No. 602 Brigadier-General Stirling of Keir, Dunblane, "Colin."
 V No. 600 R. W. R. Mackenzie, Earls hall, Leuchars, "Bandrol" (635)
 H No. 599 Buchanan Dunsmore, 6 Comely Bank, Perth, "Boadventure of Earls hall" (641).

EXTRA STOCK.

The following was Very Highly Commended and a Silver Medal awarded :

- No. 603 William Mathewson, Middlebank, Dunfermline, "Max of Middlebank" (875).

CLASS 74. ENTIRE COLT, not exceeding 10½ Hands, foaled in 1918 or 1919.—Premiums, £8, £5, £3, and £2.

- 1st No. 607 William Mathewson, Middlebank, Dunfermline, "Sambo of Middlebank."
 2nd No. 604 Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, "Everyman of Auchlochan" (Vol. 28).
 3rd No. 606 R. W. R. Mackenzie, Earls hall, Leuchars, "Nemed of Balmuir."
 4th No. 605 Mrs Etta Duffus, Penniwells, Elstree, Herts, "Florian of Penniwells."

Shetland Pony Foal, exhibited along with Dam in Class 75.—Premiums, £5, £3, and £2, given by "Four Lovers of the Breed," per Mr W. Mungall of Transy.

- 1st No. 609 Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, "Bellona of Auchlochan" (3510).
 2nd No. 611 Buchanan Dunsmore, 6 Comely Bank, Perth, "Fenella" (2659).
 3rd No. 610 Mrs Etta Duffus, Penniwells, Elstree, Herts, "Mayfly of Penniwells" (2582).

CLASS 75. MARE, not exceeding 10½ Hands, with Foal at Foot.—Premiums, £8, £5, £3, and £2.

- 1st No. 614 R. W. R. Mackenzie, Earls hall, Leuchars, "Blend of Earls hall" (3391).
 2nd No. 610 Mrs Etta Duffus, Penniwells, Elstree, Herts, "Mayfly of Penniwells" (2582).
 3rd No. 609 Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, "Bellona of Auchlochan" (3510).
 4th No. 612 J. E. Kerr of Harviestoun, Dollar, "Bagatello" (2895).
 V No. 617 William Mathewson, Middlebank, Dunfermline, "Scruple" (3258).
 H No. 615 R. W. R. Mackenzie, Earls hall, Leuchars, "Rowenna Earls hall" (3397).
 C No. 608 Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, "Primavera of Auchlochan" (3209).

CLASS 76. YELD MARE, not exceeding 10½ Hands.—Premiums, £8, £5, £3, and £2.

- 1st No. 621 Mrs Etta Duffus, Penniwells, Elstree, Herts, "May Queen of Penniwells" (3348).
 2nd No. 622 J. E. Kerr of Harviestoun, Dollar, "Snowdon 2nd" (2947).
 3rd No. 620 Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, "Erica of Auchlochan."
 4th No. 623 R. W. R. Mackenzie, Earls hall, Leuchars, "Bertha of Blackcombe."

CLASS 77. FILLY, not exceeding 10½ Hands, foaled in 1918 or 1919.—
 Premiums, £8, £5, £3, and £2.

- 1st No. 626 Mrs Etta Duffus, Penniwells, Elstree, Herts, "Mayfair of Penniwells."
 2nd No. 624 Charles Douglas, D.Sc., C.B., of Auchlochan, Leamahagow, "Faithful of Auchlochan."
 3rd No. 628 R. W. R. Mackenzie, Earlsall, Leuchars, "Brier Rose of Earlsall."
 4th No. 627 J. E. Kerr of Harviestoun, Dollar, "Harviestoun Snowdrop."

HORSES IN HARNESS.

PRESIDENT'S CHAMPION MEDAL *for the best animal in the Classes for Horses in Harness.*

- No. 634 William S. Miller of Balmanno Castle, Bridge of Earn, Mare, "Charm" (25,396).

Champion Prize of £5 given by Hackney Horse Society, per Mr W. S. Miller of Balmanno Castle, *for the best animal in the Harness Classes.*

- No. 634 William S. Miller of Balmanno Castle, Bridge of Earn, Mare, "Charm" (25,396).

NOVICE CLASSES.

CLASS 78. PONY, MARE or GELDING, any age, in Harness, not exceeding 14 Hands, driven in the ring.—Premiums, £10, £7, £5, and £3.

- 1st No. 630 John Highet, Wardhead, Stewarton, Mare, "Parkside Modesta" (24,564).
 2nd No. 629 Peter Ballantyne, 25 Ailsa Drive, Langside, Glasgow, Gelding.
 3rd No. 549 Chassells Bros., Muirhouses, Motherwell, Mare, "Miss Bell."

CLASS 79. MARE or GELDING, any age, in Harness, over 14 and not exceeding 15 Hands, driven in the ring.—Premiums, £10, £7, £5, and £3.

- 1st No. 634 William S. Miller of Balmanno Castle, Bridge of Earn, Perthshire, Mare, "Charm" (25,396).
 2nd No. 635 Robert Scott, Thornhome, Carluke, Mare, "Nancy Stair" (25,272).
 3rd No. 631 Peter Ballantyne, 25 Ailsa Drive, Langside, Glasgow, Mare, "Skyline."
 4th No. 632 William Kinross, 13 Clarendon Place, Stirling, Gelding, "Sir William."
 V No. 636 William Wood, Blair Drummond, Perthshire, Gelding, "Firemaster."

CLASS 80. MARE or GELDING, any age, in Harness, over 15 Hands, driven in the ring.—Premiums, £10, £7, £5, and £3.

- 1st No. 639 Enoch Glen, Kaim Park, Bathgate, Gelding, "Glenavon Jovial" (13,331).
 2nd No. 640 John Highet, Wardhead, Stewarton, Gelding, "Kentmere King" (190).
 3rd No. 641 J. E. Kerr of Harviestoun, Dollar, Mare, "Merry Crompton" (23,681).
 4th No. 642 A. Rankine, South Street, Bo'ness, Mare, "Mons Meg" (25,270).
 V No. 643 Robert Scott, Thornhome, Carluke, Mare, "Duneira" (24,482).
 H No. 637 D. A. Anderson, 80 Crossgate, Cupar, Gelding, "Rowan Matthias."

OPEN CLASSES.

CLASS 81. PONY, MARE, or GELDING, any age, in Harness, not exceeding 14 Hands, driven in the ring.—Premiums, £12, £8, and £4.

- 1st No. 630 John Highet, Wardhead, Stewarton, Mare, "Parkside Modesta" (24,564).
 2nd No. 552 William S. Miller of Balmanno Castle, Bridge of Earn, Mare, "Kitty Melbourne" (20,795).
 3rd No. 629 Peter Ballantyne, 25 Ailsa Drive, Langside, Glasgow, Gelding.

CLASS 82. MARE or GELDING, any age, in Harness, over 14, and not exceeding 15 Hands, driven in the ring.—Premiums, £20, £10, and £4.

- 1st No. 634 William S. Miller of Balmanno Castle, Bridge of Earn, Perthshire, Mare, "Charm" (25,396).
 2nd No. 644 Enoch Glen, Kaim Park, Bathgate, Mare, "Glenavon Trixie" (24,508).
 3rd No. 635 Robert Scott, Thornhome, Carluke, Mare, "Nancy Stair" (25,272).
 V No. 631 Peter Ballantyne, 25 Ailsa Drive, Langside, Glasgow, "Skyline."
 H No. 632 William Kinross, 13 Clarendon Place, Stirling, "Sir William."
 C No. 636 William Wood, Blair Drummond, Perthshire, Gelding, "Firemaster."

CLASS 83. MARE or GELDING, any age, in Harness, over 15 Hands, driven in the ring.—Premiums, £20, £10, and £4.

- 1st No. 645 William S. Miller of Balmanno Castle, Bridge of Earn, Perthshire, Gelding, "Propaganda" (695).
 2nd No. 639 Enoch Glen, Kaim Park, Bathgate, Gelding, "Glenavon Jovial" (13,331).
 3rd No. 640 John Highet, Wardhead, Stewarton, Gelding, "Kentmere King" (190).
 V No. 642 A. Rankine, South Street, Bo'ness, Mare, "Mons Meg" (25,270).

JUMPING COMPETITIONS.

Champion Prize of £10 for the most points in Prizes with one or more Horses in Classes 1, 2, and 3.

CONDITIONS.—First Prize to count five points ; Second Prize, four points ; Third Prize, three points ; Fourth Prize, two points ; Fifth Prize, one point. The money to be evenly divided in the event of a tie.

CLASS 1. HORSE or PONY, any height.—Premiums, £20, £15, £10, £5, and £3.

- 1st Frank Allison, Newbiggin, Penrith, Mare, "Temptress."
 2nd Charles O. Craig, Kinkaidstone, Ayr, Gelding, "Tom."
 3rd Miss Gladys Traill, Aberdeen, Gelding, "Aviator."
 4th Alistair S. T. Russell, 7 Comely Bank Terrace, Edinburgh, Mare "Blinkbonny."
 5th Ernest Bradley, Newton, Gt. Ayton, Gelding, "Little Hero."

CLASS 2. HORSE or PONY, any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in Class 1.—Premiums, £10, £8, £5, £3, and £2.

- 1st Ernest Bradley, Newton, Gt. Ayton, Gelding, "Little Hero."
- 2nd Alistair S. T. Russell, 7 Comely Bank Terrace, Edinburgh, Mare, "Blinkbonny."
- 3rd Miss Gladys Traill, Aberdeen, Gelding, "Aviator."
- 4th Captain W. H. Muir, King's Dragoon Guards, Redford, Gelding, "Towser."
- 5th Charles O. Craig, Kinkaidstone, Ayr, Gelding, "Tom."

CLASS 3. HORSE or PONY, any height. Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in either of Classes 1 or 2—4 inches extra for the winner of the two first prizes in Classes 1 and 2.—Premiums, £10, £8, £5, £3, and £2.

- 1st Frank Allison, Newbiggin, Penrith, Mare, "Temptress."
- 2nd Charles O. Craig, Kinkaidstone, Ayr, Gelding, "Tom."
- 3rd A. J. Auchterlonie, Leckerstone, Dunfermline, Mare, "Lena."
- 4th Ernest Bradley, Newton, Gt. Ayton, Gelding, "Little Hero."
- 5th Ernest Bradley, Newton, Gt. Ayton, Gelding, "Tony."

CLASS 4. HORSE or PONY, any height.—Premiums, £10, £8, £5, £3, and £2.

- 1st Alistair S. T. Russell, 7 Comely Bank Terrace, Edinburgh, Mare, "Blinkbonny."
- 2nd { Miss Gladys Traill, Aberdeen, Gelding, "Aviator."
- 3rd { Frank Allison, Newbiggin, Penrith, Mare, "Temptress."
- 4th { Captain W. H. Muir, King's Dragoon Guards, Redford, Gelding, "Towser."
- 5th Charles O. Craig, Kinkaidstone, Ayr, Gelding, "Tom."

CHAMPION PRIZE.

Frank Allison, Newbiggin, Penrith, Mare, "Temptress."

SHEEP.

BLACKFACE.

PRESIDENT'S CHAMPION MEDAL for best Animal of Blackface breed.

No. 653 M. G. Hamilton, Woolfords, Cobbinshaw, "Universal."

Fife and Kinross Perpetual Gold Challenge Cup, value £200, for best Blackface animal, "Extra Stock" being eligible to compete. This Cup, along with an endowment of £400, was subscribed for by the Counties of Fife and Kinross in commemoration of the Society's first Show at Cupar-Fife in 1912.

No. 653 M. G. Hamilton, Woolfords, Cobbinshaw, "Universal."

CLASS 84. TUP above one Shear.—Premiums, £12, £8, £4, and £2.

- 1st No. 653 M. G. Hamilton, Woolfords, Cobbinshaw, "Universal."
- 2nd No. 656 D. & T. Lindsay, Ascreavie, Kirriemuir.
- 3rd No. 669 James M'Laren, Shielbrae, Stirling.

- 4th No. 658 James M'Laren, Shielbrae, Stirling.
 V No. 655 D. & T. Lindsay, Ascreavie, Kirriemuir, "Borland."
 H No. 660 Octavius Monkhouse, Cowhill, Wearhead, "Black Knight."
 C No. 652 James M. Dunlop, Parish Holm, Douglas, Lanarkshire,
 "Pilot."
 C No. 648 W. W. Anderson, Colzium, Kirknewton, "Highland Blend."

CLASS 85. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

- 1st No. 674 M. G. Hamilton, Woolfords, Cobbinshaw.
 2nd No. 672 M. G. Hamilton, Woolfords, Cobbinshaw.
 3rd No. 673 M. G. Hamilton, Woolfords, Cobbinshaw.
 4th No. 675 M. G. Hamilton, Woolfords, Cobbinshaw.
 V No. 676 M. G. Hamilton, Woolfords, Cobbinshaw.
 H No. 681 Andrew Semple, Rosebank, Mid-Calder.
 C No. 682 Andrew Semple, Rosebank, Mid-Calder.

CLASS 86. SHEARLING TUP, which shall have been entirely out-wintered, and which shall not have been clipped *before* 1st May 1921.—Premiums, £12, £8, £4, and £2.

- 1st No. 694 D. & T. Lindsay, Ascreavie, Kirriemuir.
 2nd No. 699 Archibald Whyte, Spott, Kirriemuir.
 3rd No. 698 Peter M'Intyre, Tighnabla, Comrie.
 4th No. 695 D. & T. Lindsay, Ascreavie, Kirriemuir.
 V No. 702 Alexander Whyte, Easter Denoon, Glamis.
 H No. 700 Archibald Whyte, Spott, Kirriemuir.
 C No. 701 Archibald Whyte, Spott, Kirriemuir.
 C No. 696 D. & T. Lindsay, Ascreavie, Kirriemuir.

CLASS 87. EWE, above one Shear, with her Lamb at foot.—Premiums, £10, £5, and £2.

- 1st No. 706 W. W. Anderson, Colzium, Kirknewton, "Lady Lothian."
 2nd No. 705 The Earl of Ancaster, Corrychrone, Callander, "Corrychrone Queen."
 3rd No. 714 D. & T. Lindsay, Ascreavie, Kirriemuir.
 V No. 715 D. & T. Lindsay, Ascreavie, Kirriemuir.
 H No. 718 Octavius Monkhouse, Cowhill, Wearhead, Co. Durham, "The Daisy."
 C No. 710 The Trustees of the late James Cadzow, Gavinburn Farm, Old Kilpatrick.
 C No. 709 Walter C. Burton, Auchtertyre, Tyndrum.
 C No. 713 A. W. Howison, Rannagulzeon, Blairgowrie.

CLASS 88. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

- 1st No. 730 D. & T. Lindsay, Ascreavie, Kirriemuir.
 2nd No. 732 D. & T. Lindsay, Ascreavie, Kirriemuir.
 3rd No. 721 The Earl of Ancaster, Corrychrone, Callander, "Corrychrone Princess."
 V No. 720 The Earl of Ancaster, Corrychrone, Callander, "Beauty of Corrychrone."
 H No. 736 Octavius Monkhouse, Cowhill, Wearhead, Co. Durham, "Queen of the Bents."
 C No. 727 Walter C. Burton, Auchtertyre, Tyndrum.
 C No. 728 Walter C. Burton, Auchtertyre, Tyndrum.
 G No. 722 W. W. Anderson, Colzium, Kirknewton, "Lothian Lass."

CHEVIOT.

PRESIDENT'S CHAMPION MEDAL for best animal of the Cheviot Breed.

No. 740. Walter S. Douglas, Hindhope, Jedburgh, "Grand Parade" (3327).

Perpetual Challenge Cup, value £25, gifted by Mr J. Borthwick, *for best Sheep in the Cheviot Classes*—given by Cheviot Sheep Society.

No. 740. Walter S. Douglas, Hindhope, Jedburgh, "Grand Parade" (3327).

CLASS 89. TUP above one Shear.—Premiums, £12, £8, £4, and £2.

1st No. 740 Walter S. Douglas, Hindhope, Jedburgh, "Grand Parade" (3327).

2nd No. 741 Walter S. Douglas, Hindhope, Jedburgh, "Wild White" (3415).

3rd No. 747 John Robson, Millknowe, Duns.

4th No. 749 R. G. & J. Shiell, Sourhope, Kelso, "Border Reiver."

V No. 742 Arthur Elliot, Hindhope, Jedburgh.

H No. 744A Robert T. Elliot, Chatto, Kelso.

C No. 744 Robert T. Elliot, Chatto, Kelso.

C No. 746 John Robson, Newton, Bellingham, "Wannies."

CLASS 90. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1st No. 768 John Robson, Millknowe, Duns.

2nd No. 764 William Hogg, Newlands, Gifford.

3rd No. 757 Walter P. Elliot, Newhall, Clovenfords.

4th No. 758 Walter P. Elliot, Newhall, Clovenfords.

V No. 771 R. G. & J. Shiell, Sourhope, Kelso.

H No. 750 John Stodart Dickson, Flemington, Dolphinton.

C No. 765 William Hogg, Newlands, Gifford.

C No. 767 John Robson, Newton, Bellingham, "The Conqueror."

CLASS 91. EWE, above one Shear, with her Lamb at foot.—Premiums, £10, £5, and £2.

1st No. 780 Simon Rutherford, Overhall, Hawick.

2nd No. 772 John Stodart Dickson, Flemington, Dolphinton.

3rd No. 779 John Robson, Millknowe, Duns.

V No. 773 John Stodart Dickson, Flemington, Dolphinton.

H No. 775 Arthur Elliot, Hindhope, Jedburgh.

G No. 776 David P. Elliot, Nisbet Hill, Duns.

CLASS 92. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1st No. 789 John Robson, Millknowe, Duns.

2nd No. 786 William Hogg, Newlands, Gifford.

3rd No. 787 William Hogg, Newlands, Gifford.

V No. 788 William Hogg, Newlands, Gifford.

H No. 784 Arthur Elliot, Hindhope, Jedburgh.

C No. 785 David P. Elliot, Nisbet Hill, Duns.

C No. 790 John Robson, Millknowe, Duns.

C No. 791 Simon Rutherford, Overhall, Hawick.

BORDER LEICESTER.

PRESIDENT'S CHAMPION MEDAL for best animal of Border Leicester breed.

No. 805 W. Gilchrist Macbeth, Dunira, Comrie, "W 2."

Gold Medal for best Male animal in the Border Leicester Classes, registered or eligible for registration in the Border Leicester Flock-Book. Animals entered as "Extra Stock" not eligible. Given by the Society of Border Leicester Sheep-Breeders.

No. 805 W. Gilchrist Macbeth, Dunira, Comrie, "W 2."

CLASS 93. TUP, above one Shear.—Premiums, £12, £8, £4, and £2.

1st No. 794 D. & W. Wallace, Auchenbrain, Mauchline, "Chapel Prince" (5077).

2nd No. 792 The Rt. Hon. A. J. Balfour, M.P., Whittingehame, Prestonkirk, "Brave Archer" (5060).

CLASS 94. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1st No. 805 W. Gilchrist Macbeth, Dunira, Comrie, "W 2."

2nd No. 799 R. & W. Dickinson, Longcroft, Oxtou, Berwickshire.

3rd No. 813 Alexander Niven, Ayton, Newburgh.

4th No. 800 Quinton Dunlop, Greenan, Ayr.

V No. 814 Alexander Niven, Ayton, Newburgh.

H No. 810 R. G. Murray & Son, Spittal, Biggar.

C No. 801 Quinton Dunlop, Greenan, Ayr.

C No. 804 W. Gilchrist Macbeth, Dunira, Comrie, "W 7."

Gold Medal for best female animal in the Border Leicester Classes, registered or eligible for registration in the Border Leicester Flock-Book. Animals entered as "Extra Stock" not eligible. Given by the Society of Border Leicester Sheep-Breeders.

No. 831 R. & W. Dickinson, Longcroft, Oxtou, Berwickshire.

CLASS 95. EWE, above one Shear.—Premiums, £10, £5, and £2.

1st No. 820 The Rt. Hon. A. J. Balfour, M.P., Whittingehame, Prestonkirk.

2nd No. 824 William Cairns Moyes, Renmure, Inverkeilor.

3rd No. 822 Frank J. Elliot, Crunklaw, Duns.

V No. 825 R. G. Murray & Son, Spittal, Biggar.

H No. 821 R. & W. Dickinson, Longcroft, Oxtou, Berwickshire.

C No. 826 R. G. Murray & Son, Spittal, Biggar.

CLASS 96. SHEARLING EWE or GIMMER.—
Premiums, £10, £5, and £2.

1st No. 831 R. & W. Dickinson, Longcroft, Oxtou, Berwickshire.

2nd No. 835 W. Gilchrist Macbeth, Dunira, Comrie, "W 2."

3rd No. 836 W. Gilchrist Macbeth, Dunira, Comrie, "W 8."

V No. 840 Alexander Niven, Ayton, Newburgh.

H No. 827 The Rt. Hon. A. J. Balfour, M.P., Whittingehame, Prestonkirk.

C No. 830 R. & W. Dickinson, Longcroft, Oxtou, Berwickshire.

C No. 841 Alexander Niven, Ayton, Newburgh.

HALF-BRED.*PRESIDENT'S CHAMPION MEDAL for best Half-Bred animal.*

No. 847 Thomas Armstrong, East Cote, Hawick.

CLASS 97. TUP, above one Shear.—Premiums, £10, £7, and £3.

1st No. 846 Mrs Alice G. Burdon, Wooperton Farm, Wooperton, Northumberland.

CLASS 98. SHEARING TUP.—Premiums, £10, £7, and £3.

1st No. 847 Thomas Armstrong, East Cote, Hawick.

2nd No. 852 George C. Cowans, Smalldene, Longframlington.

3rd No. 851 George C. Cowans, Smalldene, Longframlington.

V No. 848 Thomas Armstrong, East Cote, Hawick.

H No. 850 Mrs Alice G. Burdon, Wooperton Farm, Wooperton, Northumberland.

C No. 849 Mrs Alice G. Burdon, Wooperton Farm, Wooperton, Northumberland.

CLASS 99. EWE above one Shear.—Premiums, £10, £5, and £2.

1st No. 856 John Stewart, Sauchland, Tynehead.

2nd No. 855 Mrs Alice G. Burdon, Wooperton Farm, Wooperton, Northumberland.

3rd No. 854 Mrs Alice G. Burdon, Wooperton Farm, Wooperton, Northumberland.

CLASS 100. SHEARING EWE or GIMMER.—
Premiums, £10, £5, and £2.

1st No. 859 W. & J. Dow, Brotherstone, St Boswells.

2nd No. 861 John Stewart, Saughland, Tynehead.

3rd No. 860 W. & J. Dow, Brotherstone, St Boswells.

V No. 858 Mrs Alice G. Burdon, Wooperton Farm, Wooperton, Northumberland.

H No. 857 Mrs Alice G. Burdon, Wooperton Farm, Wooperton, Northumberland.

C No. 862 John Stewart, Saughland, Tynehead.

CLASS 101. THREE EWE LAMBS.—Premiums, £5, £3, and £2.

1st No. 863 Thomas Armstrong, East Cote, Hawick.

2nd No. 864 Mrs Alice G. Burdon, Wooperton Farm, Wooperton, Northumberland.

3rd No. 867 Adam Hogg, Duncanlaw, Gifford.

V No. 865 W. & J. Dow, Brotherstone, St Boswells.

H No. 866 Robert Wylie Hill, Balthayock, Perth.

OXFORD-DOWN.*PRESIDENT'S CHAMPION MEDAL for best Oxford-Down animal.*

No. 877 T. & M. Templeton, Sandyknowe, Kelso.

Roberton Challenge Cup, value £50, for the best Oxford-Down animal bred in Scotland—given by Oxford-Down Sheep-Breeders' Association.

No. 877 T. & M. Templeton, Sandyknowe, Kelso.

CLASS 102. SHEARLING TUP.—Premiums, £8, £5, and £3.

- 1st No. 877 T. & M. Templeton, Sandyknowe, Kelso.
 2nd No. 879 T. & M. Templeton, Sandyknowe, Kelso.
 3rd No. 878 T. & M. Templeton, Sandyknowe, Kelso.
 V No. 869 Robert Graham, Kaimflat, Kelso, "Majestic."
 H No. 875 John Robertson, Ladyrig, Kelso (343).
 C No. 874 William T. Malcolm, Whittingehame Mains, Prestonkirk.

CLASS 103. SHEARLING EWE or GIMMER.—Premiums, £8, £5, and £3

- 1st No. 885 John Robertson, Ladyrig, Kelso (343).
 2nd No. 888 T. & M. Templeton, Sandyknowe, Kelso.
 3rd No. 883 H. B. Ireland, Ballindean, Kilmany, by Dundee.
 V No. 887 T. & M. Templeton, Sandyknowe, Kelso.
 H No. 880 Robert Graham, Kaimflat, Kelso.

CLASS 104. TUP LAMB.—Premiums, £8, £5, and £3.

- 1st No. 894 T. & M. Templeton, Sandyknowe, Kelso.
 2nd No. 890 William T. Malcolm, Whittingehame Mains, Prestonkirk.
 3rd No. 892 John Robertson, Ladyrig, Kelso (343).
 V No. 895 T. & M. Templeton, Sandyknowe, Kelso.
 H No. 889 Robert Graham, Kaimflat, Kelso.

CLASS 105. THREE EWE LAMBS.—Premiums, £8, £5, and £2.

- 1st No. 899 John Robertson, Ladyrig, Kelso (343).
 2nd No. 898 William T. Malcolm, Whittingehame Mains, Prestonkirk.
 3rd No. 900 T. & M. Templeton, Sandyknowe, Kelso.
 H No. 896 Robert Graham, Kaimflat, Kelso.
 H No. 897 H. B. Ireland, Ballindean, Kilmany, by Dundee.

SUFFOLK.*PRESIDENT'S CHAMPION MEDAL for best Suffolk Sheep.*

No. 924 G. Bertram Shields, Dolphingstone, Tranent, East Lothian.

Special Prize of £10, 10s. for best group comprising *Tup, Ewe, Tup Lamb and Ewe Lamb entered in Classes 106, 107, 108, and 109*—given by Mr Dugald M'Kechnie, Glasgow.

Nos. 905, 915, 924, 932 G. Bertram Shields, Dolphingstone, Tranent, East Lothian.

CLASS 106. SHEARLING TUP.—Premiums, £8, £5, and £3.

- 1st No. 905 G. Bertram Shields, Dolphingstone, Tranent, East Lothian.
 2nd No. 903 W. W. Hope, The Knowes, Prestonkirk.
 3rd No. 901 Samuel Barr, Nottylees, Kelso, "Benjamin" (15,954).
 V No. 902 William Golightly, Whitelaw, Haddington.
 C No. 904 John Robertson, Ladyrig, Kelso (670).

CLASS 107. SHEARLING EWE or GIMMER
—Premiums, £8, £5, and £3.

- 1st No. 915 G. Bertram Shields, Dolphingstone, Tranent, East Lothian.
 2nd No. 914 G. Bertram Shields, Dolphingstone, Tranent, East Lothian.
 3rd No. 913 W. W. Hope, The Knowes, Prestonkirk.
 V No. 912 W. W. Hope, The Knowes, Prestonkirk.
 H No. 911 Mrs M. W. Hogarth, Galalaw, Kelso.
 C No. 910 Mrs M. W. Hogarth, Galalaw, Kelso.

Special Prize of £5 5s. for best *Tup Lamb bred in Scotland*—given by Mr S. R. Sherwood, Playford, Ipswich.

No. 924 G. Bertram Shields, Dolphingstone, Tranent, East Lothian.

CLASS 108. TUP LAMB.—Premiums, £8, £5, and £3.

1st No. 924 G. Bertram Shields, Dolphingstone, Tranent, East Lothian

2nd No. 923 W. W. Hope, The Knowes, Prestonkirk.

3rd No. 925 G. Bertram Shields, Dolphingstone, Tranent, East Lothian

V No. 922 W. W. Hope, The Knowes, Prestonkirk.

H No. 916 Samuel Barr, Nottylees, Kelso.

C No. 926 G. Bertram Shields, Dolphingstone, Tranent, East Lothian.

Special Prize of £5 5s. for best *pen of Ewe Lambs bred in Scotland*—given by Mr S. R. Sherwood, Playford, Ipswich.

No. 932 G. Bertram Shields, Dolphingstone, Tranent, East Lothian.

CLASS 109. THREE EWE LAMBS.—Premiums, £8, £5, and £2.

1st No. 932 G. Bertram Shields, Dolphingstone, Tranent, East Lothian.

2nd No. 931 W. W. Hope, The Knowes, Prestonkirk.

3rd No. 929 William Golightly, Whitelaw, Haddington.

V No. 930 Mrs M. W. Hogarth, Galalaw, Kelso.

H No. 927 Samuel Barr, Nottylees, Kelso.

C No. 928 C. Brook, Kinmount, Annan.

EXTRA STOCK.

The following was Very Highly Commended, and a Silver Medal awarded:

No. 933 W. W. Hope, The Knowes, Prestonkirk, "Grand Parade" (15,666). (Suffolk Tup.)

SHROPSHIRE.

PRESIDENT'S CHAMPION MEDAL for best *Shropshire Animal*.

No. 934 T. A. Buttar, Corston, Coupar-Angus.

CLASS 110. SHEARLING TUP.—Premiums, £6, £4, and £2.

1st No. 934 T. A. Buttar, Corston, Coupar-Angus.

2nd No. 936 T. A. Buttar, Corston, Coupar-Angus.

3rd No. 935 T. A. Buttar, Corston, Coupar-Angus.

CLASS 111. SHEARLING EWE or GIMMER.—Premiums, £5, £3, and £2.

1st No. 939 T. A. Buttar, Corston, Coupar-Angus.

2nd No. 938 T. A. Buttar, Corston, Coupar-Angus.

3rd No. 937 T. A. Buttar, Corston, Coupar-Angus.

V No. 940 R. Rattray, Parkconon, Arbroath.

H No. 941 R. Rattray, Parkconon, Arbroath.

FAT SHEEP.

CLASS 112. Three FAT LAMBS, any Breed or Cross, dropped in the year of the Show.—Premiums, £5, £3, and £2.

1st No. 945 John Robertson, Brodieshill, Forres (Suffolk Tup and Leicester Ewe).

2nd No. 943 James Provan, Wallacetown, Bridge of Earn (Suffolk and Leicester Cross Lambs).

3rd No. 944 John Robertson, Brodieshill, Forres (Suffolk Tup and Leicester Ewe).

V No. 942 W. & J. Dow, Brotherstone, St Boswells (Cross Suffolk).

GOATS.

OPEN CLASSES.

PRESIDENT'S CHAMPION MEDAL for best animal in the Goat Classes.

No. 953 The Baroness Burton, Dochfour, Inverness (Anglo-Nubian-Swiss), "Withdean Topsy * 2 *" (2662).

CLASS 113. MALE GOAT, any Variety, over one year.—Premiums, £3, £2, and £1.

1st No. 946 The Baroness Burton, Dochfour, Inverness, (Anglo-Nubian-Swiss), "†Dochfour Arrogance" (3503).

2nd No. 949 Lady Helen Graham, Buchanan Castle, Drymen, Glasgow, (Anglo-Swiss), "Ciceter Jackanapes" (3128).

3rd No. 947 Miss M. E. Duff, Earlsneuk, Elie, (Anglo-Nubian-Swiss), "†Prestige of Bashley" (3291).

V No. 950 Mrs Sydney Macdonald, Garrochty, Kingarth, Rothesay, Isle of Bute, (Anglo-Nubian), "Heydon Tango" (A N 1308).

H No. 948 Miss Crum Ewing, Strathleven, Dumbarton, (Toggenburg), "Leazes Dewfall" (T 413).

C No. 952. Arthur M'Ivor, 20 Polmaise Place, Cowie, Stirling, (Anglo-Swiss), "Billy" (101).

Challenge Cup, value 20 Guineas, for the best Female Goat in the Show—given by Lord Dewar, London.

No. 953 The Baroness Burton, Dochfour, Inverness (Anglo-Nubian-Swiss), "Withdean Topsy * 2 *" (2662).

Challenge Cup, value £10, for best Female Anglo-Nubian Goat over two years old, in milk, entered in the Anglo-Nubian Section of the Herd-Book, "Extra Stock" being eligible to compete—given by Mrs S. Macdonald, Garrochty.

No. 961 Mrs Sydney Macdonald, Garrochty, Kingarth, Rothesay, Isle of Bute (Anglo-Nubian), "Harbro' Locust" (A N 957).

CLASS 114. FEMALE GOAT, any Variety, over two years.—Premiums, £3, £2, and £1.

1st No. 953 The Baroness Burton, Dochfour, Inverness, (Anglo-Nubian-Swiss), "Withdean Topsy * 2 *" (2662).

2nd No. 960 Miss Henderson, The Riding, Hexham, (British-Alpine), "Riding Salop" (3730).

3rd No. 956 Miss Crum Ewing, Strathleven, Dumbarton, (Anglo-Nubian-Swiss), "Strathleven Maduinn" (K R 6933).

V No. 961 Mrs Sydney Macdonald, Garrochty, Kingarth, Rothesay, Isle of Bute (Anglo-Nubian), "Harbro' Locust" (A N 957).

H No. 954 Miss W. E. Cox, Largo House, Largo, Fife, (Anglo-Nubian-Swiss), "Zialcok Simlax" (K R 4500).

C No. 958 Miss A. L. Guthrie-Smith, Achnagowen, Killearn, (Swiss), "Una" (57).

C No. 962 Mrs Sydney Macdonald, Garrochty, Kingarth, Rothesay, Isle of Bute, (Anglo-Nubian), "Sadberge Merle" (A N 972).

C No. 964 Mrs C. J. Munro, Hillwood Cottage, Ratho, (Anglo-Nubian-Swiss), "Roughets Mowitch" (4066).

C No. 967 Miss Elinor Swan, Swanston Cottage, Colinton, (Anglo-Toggenburg), "Topsy."

CLASS 115. GOATLING, any Variety, over one and not exceeding two years.—Premiums, £3, £2, and £1.

- 1st No. 977 Miss Henderson, The Riding, Hexham (Anglo-Nubian-Swiss), "Riding Topsy II." (4360).
 2nd No. 975 Lady Helen Graham, Buchanan Castle, Drymen, Glasgow (Anglo-Nubian-Swiss), "Contadina of Buchanan" (4325).
 3rd No. 974 Lady Helen Graham, Buchanan Castle, Drymen, Glasgow (Anglo-Nubian-Swiss), "Chocolate of Buchanan" (K R 8120).
 V No. 978 Miss Henderson, The Riding, Hexham (Anglo-Swiss), "Riding Crystal" (4356).
 H No. 969 Miss M. F. Duff, Earlsneuk, Elie (Anglo-Nubian-Swiss), "Earlsferry Primrose" (106).
 C No. 968 Miss M. E. Duff, Earlsneuk, Elie (Anglo-Nubian Swiss), "Earlsferry Pretty Maid" (105).
 C No. 973 Miss Crum Ewing, Strathleven, Dumbarton (Toggenburg), "Strathleven Altnahara" (T 451).
 C No. 980 Mrs Sydney Macdonald, Garrochty, Kingarth, Rothesay, Isle of Bute (British Alpine), "Tapioca of Notts" (H B 4091, K R 7456).

CLASS 116. MALE KID, any Variety, not exceeding one year.—Premiums, £3, £2, and £1.

- 1st No. 981 Baroness Burton, Dochfour, Inverness (Anglo-Nubian-Swiss), "† Dochfour Opyx" (4665).
 2nd No. 986 Mrs Reginald Pease, Sledwich, Barnard Castle (British Alpine), "Atherstone Nonsense" (K R 8384, H B 4593).
 3rd No. 985 Mrs Sydney Macdonald, Garrochty, Kingarth, Rothesay (British Alpine), "Garrochty Rambler" (K R 8601).
 V No. 984 Miss Henderson, The Riding, Hexham (British Alpine), "Riding Laffy" (4783).
 C No. 983 Miss Crum Ewing, Strathleven, Dumbarton (Anglo-Nubian Swiss), "Strathleven Buidhe" (K R 8790).

CLASS 117. FEMALE KID, any Variety, not exceeding one year.—Premiums, £3, £2, and £1.

- 1st No. 997 Miss Henderson, The Riding, Hexham (Anglo-Nubian-Swiss), "Riding Hazel" (4781).
 2nd No. 994 Lady Helen Graham, Buchanan Castle, Drymen, Glasgow (Anglo-Nubian-Swiss), "Diamond of Buchanan" (4799).
 3rd No. 992 Miss Crum Ewing, Strathleven, Dumbarton (Anglo-Nubian-Swiss), "Strathleven Benula" (K R 8642).
 V No. 996 Miss Henderson, The Riding, Hexham (Anglo-Nubian-Toggenburg), "Riding Constance,"
 H No. 995 Miss A. L. Guthrie-Smith, Achnagowen, Killearn (Swiss), "Bunty Mea" (8830).
 C No. 989 Mrs Blair, St. Thomas's Well, Cambusbarron, Stirling (Anglo-Nubian-Swiss), "Red Ruby" (K R 8761).
 C No. 990 Miss M. E. Duff, Earlsneuk, Elie (Anglo-Nubian-Swiss), "Earlsferry Pride" (K R 8913).
 C No. 993 Miss Crum Ewing, Strathleven, Dumbarton (Anglo-Nubian-Swiss), "Strathleven Bein-na-Bahn" (K R 8643).

CLASS 118. MILKING COMPETITION, open to Classes 114 and 120 (animals two years and over).—Premiums, £3, £2, and £1.

- 1st No. 960 Miss Henderson, The Riding, Hexham (British-Alpine), "Riding Salop" (3730).
 2nd No. 961 Mrs Sydney Macdonald, Garrochty, Kingarth, Rothesay, Isle of Bute (Anglo-Nubian), "Harbro' Locust" (AN 957).

- 3rd No. 953 The Baroness Burton, Dochfour, Inverness (Anglo-Nubian-Swiss), "Withdean Topsy * 2 *" (2662).
 V No. 1004 Mrs Blair, St Thomas's Well, Cambusbarron, Stirling (Anglo-Swiss-Saanem), "Jane" (S R 98).
 H No. 962 Mrs Sydney Macdonald, Garrochty, Kingarth, Rothesay, Isle of Bute (Anglo-Nubian), "Sadberge Merle" (A N 972).

CONFINED TO SCOTTISH EXHIBITORS.

CLASS 119. MALE GOAT, any Variety, one year old and over.—Premiums £3, £2, and £1.

- 1st No. 946 The Baroness Burton, Dochfour, Inverness (Anglo-Nubian-Swiss), "†Dochfour Arrogance" (3503).
 2nd No. 949 Lady Helen Graham Buchanan Castle, Drymen, Glasgow (Anglo-Swiss), "Ciceter Jackanapes" (3128).
 3rd No. 947 Miss M. E. Duff, Earlsneuk, Elie (Anglo-Nubian-Swiss), "†Prestige of Bashley" (3291).
 H No. 948 Miss Crum Ewing, Strathleven, Dumbarton (Toggenburg), "Leazes Dewfall" (T 413).
 C No. 1003 James M'Arthur, Dunmore Cottage, Plean, Stirlingshire (Toggenburg), "Pax" (6859).

CLASS 120. FEMALE GOAT, in milk, any age.—Premiums, £3, £2, and £1, given by the Baroness Burton, Dochfour.

- 1st No. 953 The Baroness Burton, Dochfour, Inverness (Anglo-Nubian-Swiss), "Withdean Topsy * 2 *" (2662).
 2nd No. 956 Miss Crum Ewing, Strathleven, Dumbarton (Anglo-Nubian-Swiss), "Strathleven Maduinn" (K R 6933).
 3rd No. 961 Mrs Sydney Macdonald, Garrochty, Kingarth, Rothesay, Isle of Bute (Anglo-Nubian), "Harbro' Locust" (A N 957).
 V No. 954 Miss W. E. Cox, Largo House, Largo, Fife (Anglo-Nubian-Swiss), "Zialcok Simlax" (K R 4500).
 H No. 962 Mrs Sydney Macdonald, Garrochty, Kingarth, Rothesay, Isle of Bute (Anglo-Nubian), "Sadberge Merle" (A N 972).
 C No. 958 Miss A. L. Guthrie-Smith, Achnagowen, Killearn (Swiss), "Una" (57).
 C No. 964 Mrs C. J. Munro, Hillwood Cottage, Ratho (Anglo-Nubian-Swiss), "Roughets Mowitch" (4066).

PIGS.

LARGE WHITE.

PRESIDENT'S CHAMPION MEDAL for best Large White Pig.

- No. 1010 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, "Spalding Wonder 6th" (24,521).

Gold Medal, value £5, for the best Large White Boar in the Show—given by the National Pig-Breeders' Association.

- No. 1010 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, "Spalding Wonder 6th" (24,521).

CLASS 121. BOAR, farrowed before 1920.—Premiums, £8, £4, and £2.

- 1st No. 1010 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, "Spalding Wonder 6th" (24,521).
 2nd No. 1007 J. D. C. Frame, senr., Broxburn, West Lothian, "Spalding Wonder 7th" (27,223).
 3rd No. 1008 P. L. Hood, Kirklands Asylum Farm, Bothwell, "Worsley Jay 72nd" (24,959).
 V No. 1005 Chivers & Sons, Ltd., Histon, Cambridge, "Histon Thor" (22,491).
 H No. 1006 Peter M. Drummond, Cherrybank, Perth, "Marcus of Cherrybank."

CLASS 122. BOAR, farrowed in 1920.—Premiums, £8, £4, and £2.

- 1st No. 1012 D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh, "Craigcrook King 32nd."
 2nd No. 1016 Mrs S. Willis, Kiltane, Dunblane, "Worsley Turk."
 3rd No. 1013 J. H. Harvey, Craig Lodge, Millhouse, Argyll, "Kilbride Prince" (29,819).

CLASS 123. BOAR, farrowed in 1921.—Premiums, £6, £3, and £1.

- 1st No. 1025 Robert Wolfe, Bathgate, "Boar."
 2nd No. 1018 D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh.
 3rd No. 1020 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, "Dalmeny Defiance."
 V No. 1021 James Stirling, Mossgrove, Bridge of Allan, "Mossgrove Sterlini."
 H No. 1019 D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh.
 C No. 1017 Lord Forteviot, Dupplin Castle, Perth.

Gold Medal, value £5, for the best Large White Sow in the Show—given by the National Pig-Breeders' Association.

- No. 1026 Chivers & Sons, Limited, Histon, Cambridge, "Histon Bertha 2nd" (53,920).

CLASS 124. SOW, farrowed before 1920.—Premiums, £8, £4, and £2.

- 1st No. 1026 Chivers & Sons, Limited, Histon, Cambridge, "Histon Bertha 2nd" (53,920).
 2nd No. 1027 J. D. C. Frame, senr., Broxburn, West Lothian, "Sundon Mary Jane" (50,776).
 3rd No. 1028 J. D. C. Frame, senr., Broxburn, West Lothian, "Mable of Walton X." (60,364).
 V No. 1033 Councillor E. G. Wright, Johnstone Gardens, Aberdeen, "Dalmeny Martha" (58,838).
 H No. 1030 D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh, "Verbena of Mains" (55,554).
 C No. 1032 Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Dalmeny Madge" (58,846).

EXTRA STOCK.

The following was Very Highly Commended and a Silver Medal awarded :

- No. 1034 J. D. C. Frame, senr., Broxburn, West Lothian, "Worsley Queen 73rd" (55,884).

The following was Highly Commended and a Medium Silver Medal awarded:

- No. 1035 D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh, "Walton Sunshine 10th" (50,896).

CLASS 125. SOW, farrowed in 1920.—Premiums, £8, £4, and £2.

- 1st No. 1039 J. D. C. Frame, senr., Broxburn, West Lothian, " Broxburn Sweethope."
 2nd No. 1037 Lord Forteviot, Dupplin Castle, Perth, " Dupplin Molly."
 3rd No. 1041 P. L. Hood, Kirklands Asylum Farm, Bothwell, " Kirklands Lass 6th."
 V No. 1042 Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, " Winwick Rose 16th."
 H No. 1040 J. D. C. Frame, senr., Broxburn, West Lothian, " Broxburn Sweethope I."
 C No. 1036 Chivers & Sons, Ltd., Histon, Cambridge, " Caldmore Bashful Lady 14th."
 C No. 1038 Lord Forteviot, Dupplin Castle, Perth, " Dupplin Viola 2nd."

CLASS 126. SOW, farrowed in 1921.—Premiums, £6, £3, and £1.

- 1st No. 1043 Lord Forteviot, Dupplin Castle, Perth.
 2nd No. 1048 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, " Dalmeny Maple Leaf."
 3rd No. 1049 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, " Dalmeny Melba."
 V No. 1052 James Stirling, Mossgrove, Bridge of Allan, " Mossgrove Moss."
 H No. 1046 J. D. C. Frame, senr., Broxburn, West Lothian, " Broxburn Queen II."
 C No. 1047 D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh.

MIDDLE WHITE.

PRESIDENT'S CHAMPION MEDAL for best Middle White Pig.

- No. 1070 John Chivers, Estate Office, Histon, Cambridge, " Histon Pianissimo " (51,542).

Gold Medal, value £5, for the best *Middle White Boar in the Show*—given by the National Pig-Breeders' Association.

- No. 1057 John Chivers, Estate Office, Histon, Cambridge, " Histon Woodman " (28,099).

CLASS 127. BOAR, any age.—Premiums, £8, £4, and £2.

- 1st No. 1057 John Chivers, Estate Office, Histon, Cambridge, " Histon Woodman " (28,099).
 2nd No. 1061 William Tytler, Doggartland, Dalry, Ayrshire, " Kilmar-nock Gold Leaf " (25,407).
 3rd No. 1058 Messrs Jones, Dunmore Park, Larbert.
 V No. 1059 Duncan Phillips, Gladstone Terrace, Stanley, Perthshire, " Ardgowan Master."

CLASS 128. BOAR, farrowed in 1921.—Premiums, £6, £3, and £1.

- 1st No. 1067 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, " Midlothian Raven."
 2nd No. 1066 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, " Midlothian Ruler."
 3rd No. 1068 Captain C. H. Walter, Chesthill, by Aberfeldy, " Chesthill Brigadier."
 V No. 1065 Duncan Phillips, Stanley, Perthshire, " Stanley Knight " (Ear No. 15).
 H No. 1062 John Chivers, Estate Office, Histon, Cambridge, " Histon Woodman 4th."

Gold Medal, value £5, for the best *Middle White Sow in the Show*—given by the National Pig-Breeders' Association.

No. 1070 John Chivers, Estate Office, Histon, Cambridge, "Histon Pianissimo" (51,542).

CLASS 129. SOW, any age.—Premiums, £8, £4, and £2.

1st No. 1070 John Chivers, Estate Office, Histon, Cambridge, "Histon Pianissimo" (51,542).

2nd No. 1069 John Chivers, Estate Office, Histon, Cambridge, "Histon Pride" (48,418).

3rd No. 1072 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, "Midlothian Rosewood" (57,000).

V No. 1071 Messrs Jones, Dunmore Park, Larbert, "Midlothian Rasp" (56,978).

CLASS 130. SOW, farrowed in 1921.—Premiums, £6, £3, and £1.

1st No. 1074 John Chivers, Estate Office, Histon, Cambridge, "Histon Lady Holly 4th."

2nd No. 1081 Dr M. J. Rowlands, Nash Farm, Keston, Kent.

3rd No. 1083 Captain C. H. Walter, Chesthill, by Aberfeldy, "Chesthill Amethyst."

V No. 1079 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, "Midlothian Ransom."

H No. 1080 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, "Midlothian Arbell."

BERKSHIRE.

PRESIDENT'S CHAMPION MEDAL for best Berkshire Pig.

No. 1097 W. Howard Palmer, Stokes Farm, Wokingham, Berks, "Murrell Lassie" (19,975).

Champion Prize of £10 for the best animal in the Berkshire Classes—given by the British Berkshire Society.

No. 1097 W. Howard Palmer, Stokes Farm, Wokingham, Berks, "Murrell Lassie" (19,975).

CLASS 131. BOAR, any age.—Premiums, £8, £4, and £2.

1st No. 1086 W. Howard Palmer, Stokes Farm, Wokingham, Berkshire, "Hammond's Hottentot" (21,218).

2nd No. 1087 The Earl of Rosebery, K.G., K.T., Dalmeny House, Edinburgh, "Thornton Hall Kerick" (21,040).

3rd No. 1084 A. H. Bishop, Thorntonhall Home Farm, Thorntonhall Station, by Glasgow, "Thorntonhall Chutney" (23,351).

CLASS 132. BOAR, farrowed in 1921.—Premiums, £6, £3, and £1.

1st No. 1090 Major J. A. Morrison, D.S.O., Basildon Park, Goring, Reading, Berks.

2nd No. 1089 A. H. Bishop, Thorntonhall Home Farm, Thorntonhall Station, by Glasgow, "Thorntonhall Sir Richard."

3rd No. 1091 W. Howard Palmer, Stokes Farm, Wokingham, Berks.

V No. 1088 A. H. Bishop, Thorntonhall Home Farm, Thorntonhall Station, by Glasgow, "Thorntonhall Jock Scot."

CLASS 133. SOW, any age.—Premiums, £8, £4, and £2.

- 1st No. 1097 W. Howard Palmer, Stokes Farm, Wokingham, Berks, "Murrell Lassie" (19,975).
 2nd No. 1095 Major J. A. Morrison, D.S.O., Basildon Park, Goring, Reading, Berks, "Basildon Princess 3rd" (22,030).
 3rd No. 1092 A. H. Bishop, Thorntonhall Home Farm, Thorntonhall Station, by Glasgow, "Thorntonhall Cherry" (23,353).
 V No. 1093 A. H. Bishop, Thorntonhall Home Farm, Thorntonhall Station, by Glasgow, "Meerbahn B" (22,389).

CLASS 134. SOW, farrowed in 1921.—Premiums, £6, £3, and £1.

- 1st No. 1100 Major J. A. Morrison, D.S.O., Basildon Park, Goring, Reading, Berks.
 2nd No. 1098 A. H. Bishop, Thorntonhall Home Farm, Thorntonhall Station, by Glasgow, "Thorntonhall Jem."
 3rd No. 1101 W. Howard Palmer, Stokes Farm, Wokingham, Berks.
 V No. 1099 A. H. Bishop, Thorntonhall Home Farm, Thorntonhall Station, by Glasgow, "Thorntonhall Missy."

LARGE BLACK.**PRESIDENT'S CHAMPION MEDAL for best Large Black Pig.**

- No. 1137 The Marquis of Graham, C.B. Easton Park, Wickham Market, Suffolk, "Easton Bessie 1st" (37,826).

CLASS 135. BOAR, any age.—Premiums, £8, £4, and £2.

- 1st No. 1104 The Viscount Allendale, South Acomb, Stocksfield-on-Tyne, "Vahan Arab II." (7679).
 2nd No. 1110 Mrs H. Russell-Fergusson, Ardtur Home Farm, Appin, "Warsop Sultan" (11,811).
 3rd No. 1111 William Tytler, Doggartland, Dalry, Ayrshire, "Vahan Bedford Bonnie" (10,713).
 V No. 1112 Councillor E. G. Wright, Johnstone Gardens, Aberdeen, "Vahan Max 43rd" (14,255).
 H No. 1103 James Adam, Park, Nairn, "Trevesquite Duke" (13,047).

CLASS 136. BOAR, farrowed in 1921.—Premiums, £6, £3, and £1.

- 1st No. 1119 George B. Hogarth, Foulden Hill, Berwick-on-Tweed, "Valley Laddie."
 2nd No. 1120 Richard Rattray, Parkconon, Arbroath, "Parkconon A1."
 3rd No. 1116 Andrew B. Dalgety, Welton Ardler, Coupar-Angus, "Caldham Lad" (18,453).
 V No. 1118 E. Hall, Langley House, Lanchester, Durham, "Lanchester Supreme" (18,509).
 H No. 1122 Councillor E. G. Wright, Johnstone Gardens, Aberdeen, "Vahan Ring the Bell."

CLASS 137. SOW any age.—Premiums, £8, £4, and £2.

- 1st No. 1137 The Marquis of Graham, C.B., Easton Park, Wickham Market, Suffolk, "Easton Bessie 1st" (37,826).
 2nd No. 1139 George B. Hogarth, Foulden Hill, Berwick-on-Tweed, "Foulden Joyce" (39,660).
 3rd No. 1124 James Adam, Park, Nairn, "Sudbourne Salome" (18,356).
 V No. 1138 Ernest Hall, Langley House, Lanchester, Co. Durham, "Horsforth Tulip" (32,636).

- H No. 1140 George B. Hogarth, Foulden Hill, Berwick-on-Tweed,
"M'Heather Lace VIII." (38,862).
C No. 1142 Captain Iain Ramsay, Kildalton, Port Ellen, Isle of Islay,
"Islay Sweet Lavender" (34,226).
C No. 1148 Councillor E. G. Wright, Johnstone Gardens, Aberdeen,
"Vahan Queen III." (30,648).

CLASS 138. SOW, farrowed in 1921.—Premiums, £6, £3, and £1.

- 1st No. 1151 Viscount Allendale, South Acomb, Stocksfield-on-Tyne,
"Bywell Sunrise" (59,646).
2nd No. 1150 James Adam, Park, Nairn.
3rd No. 1152 Andrew B. Dalgety, Wellton Ardler, Coupar-Angus,
"Caldham Girl" (61,534).
V No. 1156 R. Ratray, Parkconon, Arbroath, "Parkconon Bertha."
H No. 1158 Councillor E. G. Wright, Johnstone Gardens, Aberdeen,
"Vahan Victory 19th."
C No. 1149 James Adam, Park, Nairn.

GLOUCESTERSHIRE OLD SPOTS.

PRESIDENT'S CHAMPION MEDAL for best Gloucestershire Old Spot Pig.

- No. 1168 The Marquis of Gráham, C.B., Easton Park, Wickham Market, Suffolk, "Sevington Searchlight 2nd."

Silver Challenge Trophy, value 40 Guineas, *for best Gloucestershire Old Spot animal*—given by the Gloucestershire Old Spots Pig Society.

- No. 1168 The Marquis of Graham, C.B., Easton Park, Wickham Market, Suffolk, "Sevington Searchlight 2nd."

CLASS 139. BOAR, any age.—Premiums, £8, £4, and £2.

- 1st No. 1162 Webbington Farms, Ltd., Webbington, Apbridge, Somerset, "Webbington Warrior."
2nd No. 1159 Sir John Anderson, Bart., The Priory, Harrold, Bedfordshire, "Cleve Hill Togo" (2940).
3rd No. 1160 John Douglas, Hanham Road, Kingswood, Bristol, "Woodstock Duncan" (1267).
H No. 1161 Mrs F. M. Rogerson, Mount Oswald, Durham, "Mount Oswald Bruno I."

CLASS 140. BOAR, farrowed in 1921.—Premiums, £6, £3, and £1.

- 1st No. 1163 Sir John Anderson, Bart., The Priory, Harrold, Beds.,
"Sonderna Jim."
2nd No. 1164 John Douglas, Hanham Road, Kingswood, Bristol (1301).
3rd No. 1165 Oscar Walker, Chew Stoke, Bristol, "Chew Stoke Nipper."

CLASS 141. SOW, any age.—Premiums, £8, £4, and £2.

- 1st No. 1168 The Marquis of Graham, C.B., Easton Park, Wickham Market, Suffolk, "Sevington Searchlight 2nd."
2nd No. 1166 Samuel T. L. Bendall, Stanley Hotel, Stanley, Perthshire,
"Stanton Prior Sunstar."
3rd No. 1170 Mrs F. M. Rogerson, Mount Oswald, Durham, "Mount Oswald Beauty I."

CLASS 142. SOW, farrowed in 1921. Premiums, £6, £3, and £1.

- 1st No. 1172 Sir John Anderson, Bart., The Priory, Harrold, Beds.,
"Sonderna Mascot."
2nd No. 1175 John Douglas, Hanham Road, Kingswood, Bristol (1388).
3rd No. 1173 Sir John Anderson, Bart., The Priory, Harrold, Beds.,
"Sonderna Violet."
H No. 1174 Sir John Anderson, Bart., The Priory, Harrold, Beds.,
"Sonderna Beauty."

CUMBERLAND.

PRESIDENT'S CHAMPION MEDAL for best Cumberland Pig.

- No. 1187 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland,
"Southley Bloom" (2693).

CLASS 143. BOAR, any age.—Premiums, £8, £4, and £2.

- 1st No. 1178 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland,
"Royal" (1254).
2nd No. 1179 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland,
"Ember Day."

CLASS 144. BOAR, farrowed in 1921.—Premiums, £6, £3, and £1.

- 1st No. 1181 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland.
2nd No. 1180 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland,
"Carry-on."

CLASS 145. SOW, any age.—Premiums, £8, £4, and £2.

- 1st No. 1187 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland,
"Southley Bloom" (2693).
2nd No. 1182 Sir J. Anderson, Bart., Dykehead, Blackford, Carlisle,
"Nancy of Barnett Rigg" (1406).
3rd No. 1185 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland,
"Jo" (1613).
V No. 1184 Sir J. Anderson, Bart., Dykehead, Blackford, Carlisle,
"Ada Lecks" (1000).
H No. 1186 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland,
"Southley White Bud" (2694).
C No. 1183 Sir J. Anderson, Bart., Dykehead, Blackford, Carlisle,
"Dykehead Mary" (1897).

CLASS 146. SOW, farrowed in 1921.—Premiums, £6, £3, and £1.

- 1st No. 1191 J. J. Wilson, Barclose, Scaleby, Carlisle, "Barclose
Orphan."
2nd No. 1190 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland.
3rd No. 1189 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland.
V No. 1188 John Steel, M.R.C.V.S., Southley, Wigton, Cumberland.

POULTRY.

First Premium—*One Sovereign*. Second Premium—*Ten Shillings*.
Where there are six or more pens competing, Third Premium—*Five Shillings*.

Champion Challenge Bowl, value £50, for the best exhibit in the Poultry
Classes—given by the Proprietors of "The Scottish Poultry News,"
Aberdeen.

- No. 146 David Reid, Firthview, Portgordon.

CHAMPION MEDALS.

1. *Best Cock, any variety.*

No. 146 David Reid, Firthview, Portgordon.

2. *Best Hen, any variety.*

No. 88 Alexander Ollar, Kilkerran Cottage, Campbeltown.

3. *Best Cockerel, any variety.*

No. 484 C. Sneddon, Kirkham, Lancs. (Modern Game).

4. *Best Pullet, any variety.*

No. 232 James Weir, Brickhouse, New Abbey Road, Dumfries.

5. *Best Waterfowl.*

No. 507 James Huntly & Son, Hirsell Poultry Farm, Coldstream.

6. *Best Turkey.*

No. 553 George F. Barron, Thomastown, Auchterless.

CLASS 1. LEGHORN—White. Cock.

1st No. 8 James Weir, Brickhouse, New Abbey Road, Dumfries.
 2nd No. 1 William Binnie, Garth House, Denny.
 3rd No. 4 William Morgan, Balcurvie, Windygates, Fife.
 V No. 7 James Stirling, Mossgrove, Bridge of Allan.
 H No. 3 Robert Durward, Boot and Shoemaker, Dunecht.
 C No. 2 John H. Brown, Kilbryde Castle, Dunblane.

CLASS 2. LEGHORN—White. Hen.

1st No. 17 James Weir, Brickhouse, New Abbey Road, Dumfries.
 2nd No. 13 R. & D. Polson, St Clair Place, Kirkcaldy.
 3rd No. 9 Fred. Argo, Bructor, Inverurie.
 V No. 16 James Stirling, Mossgrove, Bridge of Allan.
 H No. 11 Robert Durward, Boot and Shoemaker, Dunecht.
 C No. 14 R. & D. Polson, St Clair Place, Kirkcaldy.

CLASS 3. LEGHORN—White. Cockerel.

1st No. 22 James Weir, Brickhouse, New Abbey Road, Dumfries.
 2nd No. 21 James Weir, Brickhouse, New Abbey Road, Dumfries.
 V No. 18 William Binnie, Garth House, Denny.
 H No. 19 Robert Durward, Boot and Shoemaker, Dunecht.

CLASS 4. LEGHORN—White. Pullet.

1st No. 26 James Weir, Brickhouse, New Abbey Road, Dumfries.
 2nd No. 27 James Weir, Brickhouse, New Abbey Road, Dumfries.
 V No. 24 Robert Durward, Boot and Shoemaker, Dunecht.
 H No. 23 William Binnie, Garth House, Denny.
 C No. 25 James Stirling, Mossgrove, Bridge of Allan.

CLASS 5. LEGHORN—any other Colour. Cock.

1st No. 33 James B. Salmond, The Glen, Glencraig, Fife (Black).
 2nd No. 29 Charles Brown, Ivybank, Kintore (Brown).
 3rd No. 28 David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock (Brown).
 V No. 30 Robert Durward, Boot and Shoemaker, Dunecht (Brown).
 H No. 31 Colonel G. J. Fergusson-Buchanan, of Auchentorlie, Bowling (Brown).

CLASS 6. LEGHORN—any other Colour. Hen.

- 1st No. 36 James B. Salmond, The Glen, Glencraig, Fife (Black).
 2nd No. 35 Robert Durward, Boot and Shoemaker, Dunecht (Brown).
 V No. 34 Charles Brown, Ivybank, Kintore (Brown).

CLASS 7. LEGHORN—any other Colour. Cockerel.

- 1st No. 40 Charles G. Blackadder, Angel Cottage, Castle Douglas (Black).
 2nd No. 44 Williamson Bros., East Lochran, Blairadam (Black).
 3rd No. 41 Robert Durward, Boot and Shoemaker, Dunecht (Brown).
 V No. 39 Mrs Charles Allan, 27 Camp Road, Crombie, Dunfermline (Brown).

CLASS 8. LEGHORN—any other Colour. Pullet.

- 1st No. 46 Robert Durward, Boot and Shoemaker, Dunecht (Brown).
 2nd No. 47 Robert Robertson, Ballingry Road, Lochore, Fife (Black).
 3rd No. 48 James B. Salmond, The Glen, Glencraig, Fife (Black).
 V No. 49 James B. Salmond, The Glen, Glencraig, Fife (Black).

CLASS 9. MINORCA. Cock.

- 1st No. 55 James Weir, Brickhouse, New Abbey Road, Dumfries.
 2nd No. 51 William Binnie, Garth House, Denny.
 V No. 52 William Binnie, Garth House, Denny.

CLASS 10. MINORCA. Hen.

- 1st No. 65 James Weir, Brickhouse, New Abbey Road, Dumfries.
 2nd No. 64 John Thomson, Middleholm Cottage, Lesmahagow.
 3rd No. 56 William Binnie, Garth House, Denny.
 V No. 63 Ian Sinclair, Fern Cottage, Inverurie.
 H No. 58 James Ford, Gow's Lodge, Invergowrie.
 C No. 61 Peter Milne, Fallows, Monikie, by Dundee.

CLASS 11. MINORCA. Cockerel.

- 1st No. 68 James Weir, Brickhouse, New Abbey Road, Dumfries.
 2nd No. 67 John Thomson, Middleholm Cottage, Lesmahagow.
 V No. 69 James Weir, Brickhouse, New Abbey Road, Dumfries.
 H No. 66 William Binnie, Garth House, Denny.

CLASS 12. MINORCA. Pullet.

- 1st No. 71 John Thomson, Middleholm Cottage, Lesmahagow.
 2nd No. 72 James Weir, Brickhouse, New Abbey Road, Dumfries.
 V No. 70 William Binnie, Garth House, Denny.
 H No. 73 James Weir, Brickhouse, New Abbey Road, Dumfries.

CLASS 13. SCOTCH GREY. Cock.

- 1st No. 79 Alexander Ollar, Kilkerran Cottage, Campbeltown.
 2nd No. 80 William Ramsay, Muirhouse Cottage, Crosshouse.
 3rd No. 77 Alexander Ollar, Kilkerran Cottage, Campbeltown.
 V No. 81 William Ramsay, Muirhouse Cottage, Crosshouse.
 H No. 76 Alexander Ollar, Kilkerran Cottage, Campbeltown.
 C No. 74 John Carswell, 148 Graham's Road, Falkirk.

CLASS 14. SCOTCH GREY. Hen.

- 1st No. 88 Alexander Oller, Kilkerran Cottage, Campbeltown.
 2nd No. 90A Alexander Ollar, Kilkerran Cottage, Campbeltown.
 3rd No. 90 Alexander Ollar, Kilkerran Cottage, Campbeltown.
 V No. 91 William Ramsay, Muirhouse Cottage, Crosshouse.
 H No. 89 Alexander Ollar, Kilkerran Cottage, Campbeltown.
 C No. 87 William Murray, High Street, Auchtermuchty.

CLASS 15. SCOTCH GREY. Cockerel.

- 1st No. 94 Alexander Ollar, Kilkerran Cottage, Campbeltown.
 2nd No. 95 William Ramsay, Muirhouse Cottage, Crosshouse.
 V No. 96 William Ramsay, Muirhouse Cottage, Crosshouse.
 H No. 92 John Carswell, 148 Graham's Road, Falkirk.

CLASS 16. SCOTCH GREY. Pullet.

- 1st No. 101 Alexander Ollar, Kilkerran Cottage, Campbeltown.
 2nd No. 98 John Carswell, 148 Graham's Road, Falkirk.
 3rd No. 103 William Ramsay, Muirhouse Cottage, Crosshouse.
 V No. 102 William Ramsay, Muirhouse Cottage, Crosshouse.
 H No. 100 Mrs M. A. Grant, Westlands, Burstow, Horley.
 C No. 97 Alexander Bonthron, Bellevue, Auchtermuchty.

CLASS 17. PLYMOUTH ROCK. Barred Cock.

- 1st No. 105 Dr E. S. Jackson, Poultry Farm, Carnforth.
 2nd No. 107 Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne.
 V No. 106 Dr E. S. Jackson, Poultry Farm, Carnforth.
 H No. 104 William Charles, Gammons, Rothienorman.
 C No. 108 William Morgan, Balcurvie, Windygates, Fife.

CLASS 18. PLYMOUTH ROCK. Barred Hen.

- 1st No. 110 William Charles, Gammons, Rothienorman.
 2nd No. 111 Dr E. S. Jackson, Poultry Farm, Carnforth.
 3rd No. 113 Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne.
 V No. 114 James Logan, Linton Lodge, Prestonkirk.
 H No. 116 W. Watt, Mill Braeheads, Prestonkirk.
 C No. 117 W. Watt, Mill Braeheads, Prestonkirk.

CLASS 19. PLYMOUTH ROCK. Barred Cockerel.

- 1st No. 121 Dr E. S. Jackson, Poultry Farm, Carnforth.
 2nd No. 119 William Charles, Gammons, Rothienorman.
 V No. 120 Dr E. S. Jackson, Poultry Farm, Carnforth.

CLASS 20. PLYMOUTH ROCK. Barred Pullet.

- 1st No. 122 Fred. Argo, Bructor, Inverurie.
 2nd No. 123 Dr E. S. Jackson, Poultry Farm, Carnforth.
 V No. 124 Dr E. S. Jackson, Poultry Farm, Carnforth.

CLASS 21. PLYMOUTH ROCK—any other Colour. Cock or Cockerel.

- 1st No. 125 Dr E. S. Jackson, Poultry Farm, Carnforth (Buff).
 2nd No. 126 Fred North, Ainsdale, Southport (White).

CLASS 22. PLYMOUTH ROCK—Any other Colour. Hen or Pullet.

- 1st No. 127 Dr E. S. Jackson, Poultry Farm, Carnforth (Buff).
 2nd No. 128 Fred. North, Ainsdale, Southport (White).

CLASS 23. ORPINGTON—Black. Cock.

- 1st No. 131 David Reid, Firthview, Portgordon.
 2nd No. 132 David Reid, Firthview, Portgordon.
 3rd No. 133 Shand & Ormiston, Hestend, Biggar.
 V No. 130 Dr E. S. Jackson, Poultry Farm, Carnforth.
 H No. 129 David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock.
 C No. 134 William Thomson, Ivy Cottage, Tynninghame, Prestonkirk.

CLASS 24. ORPINGTON—Black. Hen.

- 1st No. 137 David Reid, Firthview, Portgordon.
 2nd No. 136 David Reid, Firthview, Portgordon.
 V No. 138 Shand & Ormiston, Hestend, Biggar.
 H No. 135 Dr E. S. Jackson, Poultry Farm, Carnforth.

CLASS 25. ORPINGTON—Black. Cockerel.

- 1st No. 140 David Reid, Firthview, Portgordon.

CLASS 26. ORPINGTON—Black. Pullet.

- 1st No. 144 C. Sneddon, Kirkham, Lancs.
 2nd No. 142 David Reid, Firthview, Portgordon.
 V No. 143 Shand & Ormiston, Hestend, Biggar.

CLASS 27. ORPINGTON—Buff. Cock.

- 1st No. 146 David Reid, Firthview, Portgordon.
 2nd No. 145 David Reid, Firthview, Portgordon.
 V No. 147 William Reid & Son, Hallcraig House, Airdrie.
 H No. 148 John Robertson, Craigend, Dundas, South Queensferry.

CLASS 28. ORPINGTON—Buff. Hen.

- 1st No. 149 David Reid, Firthview, Portgordon.
 2nd No. 150 William Reid & Son, Hallcraig House, Airdrie.

CLASS 29. ORPINGTON—Buff. Cockerel.

- 1st No. 151 David Reid, Firthview, Portgordon.
 2nd No. 152 David Reid, Firthview, Portgordon.
 V No. 154 John Robertson, Craigend, Dundas, South Queensferry.

CLASS 30. ORPINGTON—Buff. Pullet.

- 1st No. 155 David Reid, Firthview, Portgordon.
 2nd No. 156 David Reid, Firthview, Portgordon.
 V No. 158 John Robertson, Craigend, Dundas, South Queensferry

CLASS 31. ORPINGTON—White. Cock.

- 1st No. 159 William Morgan, Balcurvie, Windygates, Fife.
 2nd No. 161 The Marquis of Tweeddale, Yester, Gifford.
 V No. 160 William Reid & Son, Hallcraig House, Airdrie.

CLASS 32. ORPINGTON—White. Hen.

- 1st No. 163 The Marquis of Tweeddale, Yester, Gifford.
 2nd No. 162 William Reid & Son, Hallcraig House, Airdrie.

CLASS 33. ORPINGTON—White. Cockerel.

- 1st No. 165 C. Sneddon, Kirkham, Lancs.
 2nd No. 166 The Marquis of Tweeddale, Yester, Gifford.
 V No. 167 The Marquis of Tweeddale, Yester, Gifford.
 H No. 168 Ben. Wilkinson, Hipperholme, near Halifax.

CLASS 34. ORPINGTON—White. Pullet.

- 1st No. 170 C. Sneddon, Kirkham, Lancs.
 2nd No. 171 The Marquis of Tweeddale, Yester, Gifford.
 V No. 172 The Marquis of Tweeddale, Yester, Gifford.
 H No. 173 Ben Wilkinson, Hipperholme, near Halifax.

CLASS 35. WYANDOTTE—Gold or Silver. Cock.

- 1st No. 175 Clifford Calvert, Homelea Poultry Farm, Silsden, Yorks.
 2nd No. 176 Clifford Calvert, Homelea Poultry Farm, Silsden, Yorks.
 3rd No. 179 William Morgan, Balcurvie, Windygates, Fife.
 V No. 177 James Lamberton, Kirkcudbright Farm, Moniaive.
 H No. 180 Daniel Ramage, Ashgrove Farm, Windygates.
 C No. 178 Duncan M'Diarmid, Gargunnoch, near Stirling.

CLASS 36. WYANDOTTE—Gold or Silver. Hen.

- 1st No. 181 Clifford Calvert, Homelea Poultry Farm, Silsden, Yorks.
 2nd No. 185 James Weir, Brickhouse, New Abbey Road, Dumfries.
 V No. 182 James Lamberton, Kirkcudbright Farm, Moniaive.
 H No. 183 James Lamberton, Kirkcudbright Farm, Moniaive.
 C No. 184 William Morgan, Balcurvie, Windygates.

CLASS 37. WYANDOTTE—Gold or Silver. Cockerel.

- 1st No. 187 Clifford Calvert, Homelea Poultry Farm, Silsden, Yorks.
 2nd No. 186 Charles Brown, Ivybank, Kintore.
 V No. 188 Clifford Calvert, Homelea Poultry Farm, Silsden, Yorks.
 H No. 189 Daniel Ramage, Ashgrove Farm, Windygates, Fife.

CLASS 38. WYANDOTTE—Gold or Silver. Pullet.

- 1st No. 190 Clifford Calvert, Homelea Poultry Farm, Silsden, Yorks.
 2nd No. 191 Clifford Calvert, Homelea Poultry Farm, Silsden, Yorks.
 V No. 192 Daniel Ramage, Ashgrove Farm, Windygates.

CLASS 39. WYANDOTTE—White. Cock.

- 1st No. 198 David Reid, Firthview, Portgordon.
 2nd No. 199 David Reid, Firthview, Portgordon.
 3rd No. 197 David Reid, Firthview, Portgordon.
 V No. 201 James Weir, Brickhouse, New Abbey Road, Dumfries.
 H No. 196 Daniel Ramage, Ashgrove Farm, Windygates.
 C No. 202 James Weir, Brickhouse, New Abbey Road, Dumfries.

CLASS 40. WYANDOTTE—White. Hen.

- 1st No. 208 David Reid, Firthview, Portgordon.
 2nd No. 209 David Reid, Firthview, Portgordon.
 3rd No. 211 James Weir, Brickhouse, New Abbey Road, Dumfries.
 V No. 206 H. J. Parker, Drummerchen, Kippen.
 H No. 212 Williamson Bros., East Lochran, Blairadam.

CLASS 41. WYANDOTTE—White. Cockerel.

- 1st No. 219 David Reid, Firthview, Portgordon.
 2nd No. 214 Charles Brown, Ivybank, Kintore.
 3rd No. 220 David Reid, Firthview, Portgordon.
 V No. 223 James Weir, Brickhouse, New Abbey Road, Dumfries.
 H No. 213 William Binnie, Garth House, Denny.

CLASS 42. WYANDOTTE—White. Pullet.

- 1st No. 232 James Weir, Brickhouse, New Abbey Road, Dumfries.
 2nd No. 230 David Reid, Firthview, Portgordon.
 3rd No. 231 James Stirling, Mossgrove, Bridge of Allan.
 V No. 225 Charles Brown, Ivybank, Kintore.
 H No. 224 William Binnie, Garth House, Denny.
 C No. 229 David Reid, Firthview, Portgordon.

CLASS 43. WYANDOTTE—Partridge. Cock or Cockerel.

- 1st No. 233 William Reid & Son, Hallcraig House, Airdrie.

CLASS 44. WYANDOTTE—Partridge. Hen or Pullet.

- 1st No. 235 Charles Brown, Ivybank, Kintore (Hen).
 2nd No. 236 William Reid & Son, Hallcraig House, Airdrie (Hen).
 V No. 234 J. A. Boardley, Slyne Road, Lancaster (Hen).

CLASS 45. WYANDOTTE—Any other colour—Cock or Cockerel.

- 1st No. 238 Dr E. S. Jackson, Poultry Farm, Carnforth (Black).
 2nd No. 237 Alfred Birch, Edge Farm, Sefton, *via* Seaforth, near Liverpool (Black).
 3rd No. 239 William Lear, Howard Cottage, Wetheral, near Carlisle (Buff).
 V No. 240 William Lear, Howard Cottage, Wetheral, near Carlisle (Buff).
 H No. 243 William Reid & Son, Hallcraig House, Airdrie (Buff).

CLASS 46. WYANDOTTE—Any other Colour. Hen or Pullet.

- 1st No. 246 William Reid & Son, Hallcraig House, Airdrie (Black).
 2nd No. 245 James Mason, 8 Starbank Road, Leith (Black).
 V No. 244 A. S. Marshall, Anglepark Cottage, Fauldhouse (Black and White).

CLASS 47. RHODE ISLAND RED. Cock.

- 1st No. 256 John Robertson, Craigend, Dundas, South Queensferry.
 2nd No. 257 Shanks, Thomas, 10 Mill Road, Bathgate.
 3rd No. 253 David Reid, Davella, Freuchie.
 V No. 252 William Morgan, Balcurvie, Windygates.
 H No. 250 James Mason, 8 Starbank Road, Leith.
 C No. 247 E. F. Bauer, Wheatfield, Craigentinny, Edinburgh.
 C No. 248 Charles Brown, Ivybank, Kintore.

CLASS 48. RHODE ISLAND RED. Hen.

- 1st No. 264 John Robertson, Craigend, Dundas, South Queensferry.
 2nd No. 260 Charles Brown, Ivybank, Kintore.
 3rd No. 261 James Mason, 8 Starbank Road, Leith.
 V No. 262 William Reid & Son, Hallcraig House, Airdrie.
 H No. 263 John Robertson, Craigend, Dundas, South Queensferry.
 C No. 250 Alexander Bisset, Knowe Head, Freuchie.

CLASS 49. RHODE ISLAND RED. Cockerel.

- 1st No. 267 James Mason, 8 Starbank Road, Leith.
 2nd No. 273 Thomas Shanks, 10 Mill Road, Bathgate.
 3rd No. 272 Thomas Shanks, 10 Mill Road, Bathgate.
 V No. 271 John Robertson, Craigend, Dundas, South Queensferry.
 H No. 269 Petrie, Alexander, Airth Station, by Larbert.
 C No. 268 William Morgan, Balcurvie, Windygates.

CLASS 50. RHODE ISLAND RED. Pullet.

- 1st No. 282 John Robertson, Craigend, Dundas, South Queensferry.
 2nd No. 283 John Robertson, Craigend, Dundas, South Queensferry.
 3rd No. 284 Thomas Shanks, 10 Mill Road, Bathgate.
 V No. 278 James Mason, 8 Starbank Road, Leith.
 H No. 281 William Reid & Son, Hallcraig House, Airdrie.
 C No. 287 Alexander Stewart, Hotel, Balbeggie, Perth.
 C No. 290 John H. White, Hawthorns Lodge, Galashiels.
 C No. 291 John H. White, Hawthorns Lodge, Galashiels.

CLASS 51. FAVEROLLES. Cock.
(No Entry.)

CLASS 52. FAVEROLLES. Hen.

- 1st No. 293 William Reid & Son, Hallcraig House, Airdrie.

CLASS 53. FAVEROLLES. Cockerel.

- 1st No. 294 James Laidler, Eastview, Paisley.

CLASS 54. FAVEROLLES. Pullet.

- 1st No. 295 James Laidler, Eastview, Paisley.

CLASS 55. SUSSEX—Light. Cock.

- 1st No. 303 The Marquis of Tweeddale, Yester, Gifford.
 2nd No. 298 James S. Hepburn, Astley, Nuneaton, Warwickshire.
 3rd No. 297 Mrs M. A. Grant, Westlands, Burstow, Horley.
 V No. 302 James Stirling, Mossgrove, Bridge of Allan.
 H No. 301 James Stirling, Mossgrove, Bridge of Allan.
 C No. 300 William Reid & Son, Hallcraig House, Airdrie.

CLASS 56. SUSSEX—Light. Hen.

- 1st No. 312 The Marquis of Tweeddale, Yester, Gifford.
 2nd No. 306 Mrs M. A. Grant, Westlands, Burstow, Horley.
 3rd No. 309 William Reid & Son, Hallcraig House, Airdrie.
 V No. 310 James Stirling, Mossgrove, Bridge of Allan.
 H No. 308 Paterson & Cleland, Luggie Bank Poultry Farm, Cumbernauld Station.
 C No. 307 Paterson & Cleland, Luggie Bank Poultry Farm, Cumbernauld Station.

CLASS 57. SUSSEX—Light. Cockerel.

- 1st No. 322 The Marquis of Tweeddale, Yester, Gifford.
 2nd No. 313 Charles Brown, Ivybank, Kintore.
 3rd No. 314 David C. Crichton, Airybank, Cousland, Dalkeith.
 V No. 319 James Stirling, Mossgrove, Bridge of Allan.
 H No. 320 James Stirling, Mossgrove, Bridge of Allan.
 C No. 315 Mrs M. A. Grant, Westlands, Burstow, Horley.

CLASS 58. SUSSEX—Light. Pullet.

- 1st No. 325 Charles Brown, Ivybank, Kintore.
 2nd No. 335 The Marquis of Tweeddale, Yester, Gifford.
 3rd No. 329 Mrs M. A. Grant, Westlands, Burstow, Horley.
 V No. 331 Alexander Gray, Meikle Bogs, Rothienorman.
 H No. 328 David C. Crichton, Airybank, Cousland, Dalkeith.
 C No. 323 John Anderson, 61 Shand Street, Wishaw.

CLASS 59. SUSSEX—Any other Variety. Cock.

- 1st No. 338 Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne (Speckled).
 2nd No. 337 Dr E. S. Jackson, Poultry Farm, Carnforth (Speckled).
 V No. 339 William Reid & Son, Hallcraig House, Airdrie (Speckled).
 H No. 336 Mrs M. A. Grant, Westlands, Burstow, Horley (Speckled).

CLASS 60. SUSSEX—Any other Variety. Hen.

- 1st No. 342 Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne (Speckled).
 2nd No. 341 Dr E. S. Jackson, Poultry Farm, Carnforth (Speckled).
 V No. 340 Mrs M. A. Grant, Westlands, Burstow, Horley (Speckled).
 H No. 343 William Reid & Son, Hallcraig House, Airdrie (Speckled).

CLASS 61. SUSSEX—Any other Variety. Cockerel.

- 1st No. 345 Dr E. S. Jackson, Poultry Farm, Carnforth (Speckled).
 2nd No. 346 Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne (Speckled).

CLASS 62. SUSSEX—Any other Variety. Pullet.

- 1st No. 349 Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne (Speckled).
 2nd No. 348 Dr E. S. Jackson, Poultry Farm, Carnforth (Speckled).
 V No. 347 Mrs M. A. Grant, Westlands, Burstow, Horley (Red).

CLASS 63. DORKING—Coloured. Cock.

- 1st No. 350 Charles Aitkenhead, Carr House Farm, New Seaham.
 2nd No. 351 John Mechie, Grain Merchant, Auchtermuchty.

CLASS 64. DORKING—Coloured. Hen.

- 1st No. 353 Charles Aitkenhead, Carr House Farm, New Seaham.
 2nd No. 354 John Mechie, Grain Merchant, Auchtermuchty.

CLASS 65. DORKING—Coloured. Cockerel.

- 1st No. 357 John Mechie, Grain Merchant, Auchtermuchty.
 2nd No. 355 Charles Aitkenhead, Carr House Farm, New Seaham.
 V No. 356 Charles Aitkenhead, Carr House Farm, New Seaham.
 H No. 358 James Rogers, Forneth, Blairgowrie.
 C No. 359 James Rogers, Forneth, Blairgowrie.

CLASS 66. DORKING—Coloured. Pullet.

- 1st No. 360 Charles Aitkenhead, Carr House Farm, New Seaham.
 2nd No. 361 John Mechie, Grain Merchant, Auchtermuchty.
 H No. 362 James Rogers, Forneth, Blairgowrie.

CLASS 67. DORKING—Silver Grey. Cock.

- 1st No. 368 The Marquis of Tweeddale, Yester, Gifford.
 2nd No. 365 John Mechie, Grain Merchant, Auchtermuchty.
 3rd No. 363 Charles Aitkenhead, Carr House Farm, New Seaham.
 V No. 364 Alexander Mann, Broomhill Road, Keith.
 H No. 366 James Rogers, Forneth, Blairgowrie.

CLASS 68. DORKING—Silver Grey. Hen.

- 1st No. 370 John Mechie, Grain Merchant, Auchtermuchty.
 2nd No. 369 Alexander Mann, Broomhill Road, Keith.
 V No. 372 The Marquis of Tweeddale, Yester, Gifford.

CLASS 69. DORKING—Silver Grey. Cockerel.

- 1st No. 375 Alexander Mann, Broomhill Road, Keith.
 2nd No. 376 John Mechie, Grain Merchant, Auchtermuchty.
 V No. 373 Charles Aitkenhead, Carr House Farm, New Seaham.

CLASS 70. DORKING—Silver Grey. Pullet.

- 1st No. 380 John Mechie, Grain Merchant, Auchtermuchty.
 2nd No. 379 Alexander Mann, Broomhill Road, Keith.
 V No. 377 Charles Aitkenhead, Carr House Farm, New Seaham.
 H No. 378 Alexander Mann, Broomhill Road, Keith.

CLASS 71. SCOTS DUMPY. Cock or Cockerel.

- 1st No. 383 John Major, Ditton, Langley, Bucks (Cock).
 2nd No. 381 J. E. Kerr, of Harviestoun, Dollar (Cock).
 V No. 384 William Reid & Son, Hallcraig House, Airdrie (Cock).
 H No. 382 J. E. Kerr, of Harviestoun, Dollar (Cock).
 C No. 385 William Reid & Son, Hallcraig House, Airdrie (Cock).

CLASS 72. SCOTS DUMPY. Hen or Pullet.

- 1st No. 387 J. E. Kerr, of Harviestoun, Dollar (Hen).
 2nd No. 386 J. E. Kerr, of Harviestoun, Dollar (Hen).
 V No. 388 John Major, Ditton, Langley, Bucks (Hen).
 H No. 389 William Reid & Son, Hallcraig House, Airdrie (Hen).
 C No. 390 William Reid & Son, Hallcraig House, Airdrie (Hen).

CLASS 73. INDIAN GAME. Cock.

- 1st No. 391 Alfred Birch, Edge Farm, Sefton, *via* Seaforth, near Liverpool.
 2nd No. 393 Arthur E. Brewin, Llysmeirchion, Trefnant, North Wales.
 V No. 394 Colonel G. J. Fergusson-Buchanan, of Auchentorlie, Bowling.
 H No. 392 William A. P. Black, Croftfoot, Old Polmont.

CLASS 74. INDIAN GAME. Hen.

- 1st No. 395 Alfred Birch, Edge Farm, Sefton, *via* Seaforth.
 2nd No. 397 C. Sneddon, Kirkham, Lancs.
 V No. 396 Francis J. B. Douglas, Redlairdston, Buchlyvie.

CLASS 75. INDIAN GAME. Cockerel.

- 1st No. 401 C. Sneddon, Kirkham, Lancs.
 2nd No. 398 Alfred Birch, Edge Farm, Sefton, *via* Seaforth.
 V No. 400 James S. Hepburn, Astley, Nuneaton, Warwickshire.
 H No. 399 Arthur E. Brewin, Llysmeirchion, Trefnant, North Wales.

CLASS 76. INDIAN GAME—Pullet.

- 1st No. 402 Alfred Birch, Edge Farm, Sefton, *via* Seaforth.
 2nd No. 405 C. Sneddon, Kirkham, Lancs.
 V No. 403 William A. P. Black, Croftfoot, Old Polmont.
 H No. 404 Arthur E. Brewin, Llysmeirchion, Trefnant, North Wales

CLASS 77. GAME—Old English. Cock.

- 1st No. 409 John Hutt, Denend, Cardenden.
 2nd No. 413 C. Sneddon, Kirkham, Lancs.
 3rd No. 406 James Bonthron, Pitcairn, Cardenden.
 V No. 415 Duncan M. Stewart, Millhills, Crieff.
 H No. 410 John Hutt, Denend, Cardenden.
 C No. 407 John T. Dodd, Riccarton, Newcastleton.
 C No. 408 John T. Dodd, Riccarton, Newcastleton.
 C No. 411 William G. Reed, Low Cote Hill Farm, Carlisle.

CLASS 78. GAME—Old English. Hen.

- 1st No. 423 C. Sneddon, Kirkham, Lancs.
 2nd No. 419 John Hutt, Denend, Cardenden.
 3rd No. 416 James Bonthron, Pitcairn, Cardenden.
 V No. 420 John Hutt, Denend, Cardenden.
 H No. 418 Andrew Hain, Lomond Road, Freuchie.
 C No. 417 John T. Dodd, Riccarton, Newcastleton.
 C No. 422 William Reid & Son, Hallcraig House, Airdrie.

CLASS 79. GAME—Old English. Cockerel.

- 1st No. 427 C. Sneddon, Kirkham, Lancs.
 2nd No. 424 Andrew Hain, Lomond Road, Freuchie.
 V No. 426 William G. Reed, Low Cote Hill Farm, Carlisle.
 H No. 425 John Hutt, Denend, Cardenden.

CLASS 80. GAME—Old English. Pullet.

- 1st No. 430 C. Sneddon, Kirkham, Lancs.
 2nd No. 428 John Hutt, Denend, Cardenden.
 V No. 429 William G. Reed, Low Cote Hill Farm, Carlisle.

CLASS 81. BANTAM—Game. Cock.

- 1st No. 434 C. Sneddon, Kirkham, Lancs.
 2nd No. 431 David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock.
 V No. 432 Miss Lizzie L. Lindsay, Coaltown, Markinch.
 H No. 433 Alexander Shepherd, Lily Cottage, Forfar.
 C No. 435 F. A. Watt, Solicitor, Banff.

CLASS 82. BANTAM.—Game. Hen.

- 1st No. 440 C. Sneddon, Kirkham, Lancs.
 2nd No. 437 Miss Lizzie L. Lindsay, Coaltown, Markinch.
 3rd No. 439 Alexander Shepherd, Lily Cottage, Forfar.
 V No. 441 F. A. Watt, Solicitor, Banff.
 H No. 438 James M'Arthur, junr., Dunmore Cottage, Plean, Stirlingshire.
 C No. 436 David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock.

CLASS 83. BANTAM—Other than Game. Cock.

- 1st No. 444 Alfred Birch, Edge Farm, Sefton, *via* Seaforth (Indian).
 2nd No. 442 David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock (Pekin White).
 3rd No. 446 William Reid & Son, Hallcraig House, Airdrie (Wyandotte).

- V No. 449 W. S. Westcott, Castle View, The Abbey, Stirling (Indian).
 H No. 443 Miss Donah S. Anderson, Damside, Auchterarder (Pekin Black).
 C No. 447 Miss Shanks, Broomhill Farm, Denny (Silkie White).

CLASS 84. BANTAM—Other than Game. Hen.

- 1st No. 450 David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock (Pekin Black).
 2nd No. 452 Alfred Birch, Edge Farm, Sefton, *via* Seaforth (Indian).
 3rd No. 453 David Hain, Lindsay Place, Freuchie (Rosecomb).
 V No. 454 James Stirling, Mossgrove, Bridge of Allan (Polish White).
 H No. 455 W. S. Westcott, Castle View, The Abbey, Stirling (Indian).

CLASS 85. ANY OTHER RECOGNISED BREED. Cock.

- 1st No. 467 C. Sneddon, Kirkham, Lancs. (Modern).
 2nd No. 466 Ian Sinclair, Fern Cottage, Inverurie (Brahma).
 3rd No. 470 James Weir, Brickhouse, New Abbey Road, Dumfries (Hamburgh).
 V No. 463 Andrew Prentice, Birkhill, Clackmannan (Russian Orloff).
 H No. 458 James Huntly & Son, Hirsell Poultry Farm, Coldstream (Ancona).
 C No. 456 Alfred Birch, Edge Farm, Sefton, *via* Seaforth (Jubilee Indian).
 C No. 457 Thomas Fullarton, Loans, Troon (Hamburgh).
 C No. 460 Dr J. M. Menzies, Hawthornbank, Selkirk (Russian Orloff).

CLASS 86. ANY OTHER RECOGNISED BREED. Hen.

- 1st No. 475 Alexander Ollar, Kilkerran Cottage, Campbeltown (Spanish).
 2nd No. 479 C. Sneddon, Kirkham, Lancs. (Modern).
 3rd No. 478 Ian Sinclair, Fern Cottage, Inverurie (Brahma).
 V No. 476 William Reid & Son, Hallcraig House, Airdrie (Blue Orpington).
 H No. 471 Alfred Birch, Edge Farm, Sefton, *via* Seaforth (Jubilee Indian).
 C No. 472 Thomas Fullarton, Loans, Troon (Hamburgh).
 C No. 474 Dr J. M. Menzies, Hawthornbank, Selkirk (Russian Orloff).

CLASS 87. ANY OTHER RECOGNISED BREED—Cockerel.

- 1st No. 484 C. Sneddon, Kirkham, Lancs. (Modern Game).
 2nd No. 480 David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock (Rosecomb).
 3rd No. 486 James Weir, Brickhouse, New Abbey Road, Dumfries (Hamburgh).
 V No. 482 Miss Lizzie L. Lindsay, Coaltown, Markinch (Modern Game).
 H No. 481 Mrs Charles Allan, 27 Camp Road, Crombie, Dunfermline (Ancona).
 C No. 483 Alexander Shepherd, Lily Cottage, Forfar (Modern Game).

CLASS 88. ANY OTHER RECOGNISED BREED. Pullet.

- 1st No. 487 David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock (Rosecomb).
 2nd No. 491 C. Sneddon, Kirkham, Lancs. (Modern Game).
 3rd No. 492 John Sutherland, Roseberry Terrace, Wick (Mahogany Orloff).
 V No. 488 Mrs Charles Allan, 27 Camp Road, Crombie, Dunfermline (Ancona).
 H No. 489 Miss Lizzie L. Lindsay, Coaltown, Markinch (Modern Game).
 C No. 490 Alexander Shepherd, Lily Cottage, Forfar (Modern Game).

CLASS 89. CROSS-BRED FOWLS FOR LAYING PURPOSES. Hen.

- 1st No. 501 William Morgan, Balcurvie, Windygates.
 2nd No. 497 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 3rd No. 496 David C. Gaudie, 45 Dishland Street, Arbroath.
 V No. 503 Daniel Ramage, Ashgrove Farm, Windygates.
 H No. 493 William Binnie, Garth House, Denny.
 C No. 499 James Lamberton, Kirkcudbright Farm, Moniaive.
 C No. 502 Alexander Petrie, Airth Station, by Larbert.

CLASS 90. CROSS-BRED FOWLS FOR LAYING PURPOSES. Pullet.

- 1st No. 505 Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne.
 2nd No. 506 James Mason, 8 Starbank Road, Leith.

CLASS 91. DUCKS—Aylesbury. Drake.

- 1st No. 507 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 2nd No. 508 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 V No. 509 Robert A. Kirkwood, Camelon Hotel, Falkirk.

CLASS 92. DUCKS—Aylesbury. Duck.

- 1st No. 510 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 2nd No. 511 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 V No. 512 Robert A. Kirkwood, Camelon Hotel, Falkirk.

CLASS 93. DUCKS—Orpington. Drake.

- 1st No. 513 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 2nd No. 514 James Huntly & Son, Hirsell Poultry Farm, Coldstream

CLASS 94. DUCKS—Orpington. Duck.

- 1st No. 515 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 2nd No. 516 James Huntly & Son, Hirsell Poultry Farm, Coldstream.

CLASS 95. DUCKS—Indian Runner. Drake.

- 1st No. 524 James Keay, Springbank, Blairgowrie.
 2nd No. 523 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 3rd No. 519 James P. Dalgleish, West Grange, Dunfermline.
 V No. 527 William Woodmass, Howard House Farm, Gilsland, Cumberland.
 H No. 520 James P. Dalgleish, West Grange, Dunfermline.
 C No. 518 James B. V. Cummings, Carlops Poultry Farm, Carlops, by Penicuik.
 C No. 521 James P. Dalgleish, West Grange, Dunfermline.

CLASS 96. DUCKS—Indian Runner. Duck.

- 1st No. 534 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 2nd No. 535 James Keay, Springbank, Blairgowrie.
 3rd No. 537 Robert A. Kirkwood, Camelon Hotel, Falkirk.
 V No. 539 William Woodmass, Howard House Farm, Gilsland, Cumberland.
 H No. 530 James P. Dalgleish, West Grange, Dunfermline.
 C No. 529 James B. V. Cummings, Carlops Poultry Farm, Carlops, by Penicuik.
 C No. 532 James P. Dalgleish, West Grange, Dunfermline.

CLASS 97. DUCKS—Any other Variety. Drake.

- 1st No. 542 James Huntly & Son, Hirsell Poultry Farm, Coldstream (Rouen).
 2nd No. 543 James Huntly & Son, Hirsell Poultry Farm, Coldstream (Rouen).

CLASS 98. DUCKS—Any other Variety. Duck.

- 1st No. 546 James Huntly & Son, Hirsell Poultry Farm, Coldstream (Rouen).
 2nd No. 545 James Huntly & Son, Hirsell Poultry Farm, Coldstream (Rouen).
 V No. 544 Arthur E. Brewin, Llysmeirchion, Trefnant, North Wales (Rouen).

CLASS 99. GEESE. Gander.

- 1st No. 549 James S. Hepburn, Astley, Nuneaton, Warwickshire.
 2nd No. 547 Edinburgh Corporation, Farm Colony, Lasswade.
 V No. 548 Edinburgh Corporation, Farm Colony, Lasswade.

CLASS 100. GEESE. Goose.

- 1st No. 550 Edinburgh Corporation, Farm Colony, Lasswade.
 2nd No. 551 Edinburgh Corporation, Farm Colony, Lasswade.
 V No. 552 Colonel G. J. Fergusson-Buchanan of Auchentorlie, Bowling.

CLASS 101. TURKEYS. Cock.

- 1st No. 553 George F. Barron, Thomastown, Auchterless.
 2nd No. 556 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 3rd No. 554 Colonel G. J. Fergusson-Buchanan of Auchentorlie, Bowling.
 V No. 558 D. M. Stewart, Millhills, Crieff.
 H No. 555 Colonel G. J. Fergusson-Buchanan of Auchentorlie, Bowling.

CLASS 102. TURKEYS. Hen.

- 1st No. 560 John Clement, Westview, Stranraer.
 2nd No. 563 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 3rd No. 561 Colonel G. J. Fergusson-Buchanan of Auchentorlie, Bowling.
 V No. 562 Colonel G. J. Fergusson-Buchanan of Auchentorlie, Bowling.
 H No. 559 George F. Barron, Thomastown, Auchterless.
 C No. 564 Robert R. Russell, Upper Kinneddar, Saline.
 C No. 565 D. M. Stewart, Millhills, Crieff.

TABLE POULTRY.

CLASS 103. TABLE FOWLS—Any Pure Breed. Pair of Cockerels.

- 1st No. 569 David Reid, Firthview, Portgordon (Buff Orpington).
 2nd No. 570 The Marquis of Tweeddale, Yester, Gifford (Sussex).
 V No. 567 Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne (Sussex).
 H No. 568 John Mechie, Grain Merchant, Auchtermuchty (Dorkings).
 C No. 566 James P. Dalgleish, West Grange, Dunfermline (Plymouth Rock).

CLASS 104. TABLE FOWLS—Any Pure Breed. Pair of Pullets.

- 1st No. 574 David Reid, Firthview, Portgordon (Buff Orpington).
 2nd No. 576 The Marquis of Tweeddale, Yester, Gifford (Sussex).
 3rd No. 573 John Mechie, Grain Merchant, Auchtermuchty (Dorkings).
 V No. 572 Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne (Sussex).
 H No. 575 J. Reid, High Street, Freuchie, Fife (Sussex).
 C No. 571 Wm. A. P. Black, Croftfoot, Old Polmont (Indian Game).

CLASS 105. TABLE FOWLS—Game-Cross. Pair of Cockerels.
(*Not forward.*)

CLASS 106. TABLE FOWLS—Game-Cross. Pair of Pullets.

- 1st No. 578 James Huntly & Son, Hirsell Poultry Farm, Coldstream.
 2nd No. 579 Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne

CLASS 107. TABLE FOWLS—Any other Cross. Pair of Cockerels.
(No Entry.)CLASS 108. TABLE FOWLS—Any other Cross. Pair of Pullets.
(No Entry.)

CLASS 109. DUCKLINGS for Table Purposes—Any Breed or Cross—Pair of Ducklings.

- 1st No. 580 James Huntly & Son, Hirsell Poultry Farm, Coldstream (Aylesbury).
 2nd No. 581 James Huntly & Son, Hirsell Poultry Farm, Coldstream (Aylesbury).

DAIRY PRODUCE.

CLASS 1. POWDERED BUTTER, not less than 3 lb.
—Premiums, £4, £2, and £1.

- 1st No. 9 Miss Rennie, Parkhead, Slamannan.
 2nd No. 11 Miss Shanks, Broomhill Farm, Denny.
 3rd No. 13 Robert Stirling, Mid Forrest, Cumbernauld.
 V No. 3 Andrew Fleming, Threepland, Eaglesham.
 H No. 5 John Hamilton, Goatmilk, Leslie.
 C No. 6 John Maule, Cambusbeg Farm, Callander.
 C No. 7 Mrs Helen Monteith, Island, Bothkennar, Falkirk.
 C No. 8 Robert M. Reid, The Glen, Falkirk.

CLASS 2. FRESH BUTTER, Three 1-lb. Rolls.
—Premiums, £4, £2, and £1.

- 1st No. 21 Mrs Helen Monteith, Island, Bothkennar, Falkirk.
 2nd No. 25 Miss Shanks, Broomhill Farm, Denny.
 3rd No. 27 Robert Stirling, Mid Forrest, Cumbernauld.
 V No. 23 Miss Rennie, Parkhead, Slamannan.
 H No. 17 Andrew Fleming, Threepland, Eaglesham.
 C No. 20 John Maule, Cambusbeg Farm, Callander.
 C No. 22 Robert M. Reid, The Glen, Falkirk.

CLASS 3. CHEDDAR CHEESE—56 lb. and upwards.
—Premiums, £6, £4, £2, and £1.

- 1st No. 38 Thomas Logan, Low Milton, Maybole.
2nd No. 35 Major Henry Keswick, Cowhill Tower, Dumfries.
3rd No. 28 William Atkinson, Trees, Maybole.
4th No. 37 Robert Littlejohn, Genoch, Ayr.
V No. 34 Robert Kerr, Machermore Mains, Newton-Stewart.
H No. 31 John Douglas, High Balyett, Stranraer.
C No. 44 John S. Stevenson, Balig, Ballantrae.

CLASS 4. SWEET-MILK CHEESE, flat shape (from a dairy where all cheese is made flat shape), white in colour, made according to the Dunlop or other method.—Premiums, £4, £2, and £1.

- 1st No. 49 John M'Colm, Cairngarroch, Drummorie, by Stranraer.
2nd No. 47 Major Henry Keswick, Lower Portrack, Cowhill Tower, Dumfries.
3rd No. 46 John Dowie, Myremill, Maybole.
V No. 50 Gavin Struthers, South Halls, Strathaven.

CLASS 5. CHEESE, 14 lb. and under.—Premiums, £3, £2, and £1.

- 1st No. 61 William M'Connell, Shankston, Patna, Ayrshire.
2nd No. 55 John Dowie, Myremill, Maybole.
3rd No. 60 John M'Colm, Cairngarroch, Drummorie, by Stranraer.
V No. 51 William Atkinson, Trees, Maybole.
H No. 65 Gavin Struthers, South Halls, Strathaven.

BEE APPLIANCES AND HONEY, &c.

Should there be in any class three or less than three entries, the 1st prize will be withdrawn. The 2nd will rank as 1st, the 3rd as 2nd, and a highly commended as 3rd.

OPEN CLASSES.

APPLIANCES.

***CLASS 1.** Collection of HIVES and APPLIANCES, to include amongst other articles the following :—Three Standard Frame Hives complete, fitted with arrangements for supering. A suitable outfit for a beginner in Bee-keeping.—Premiums, 80s., 40s., and 20s.

- 1st No. 2 R. Steele & Brodie, Bee Appliance Works, Wormit.
2nd No. 3 E. H. Taylor, Ltd., Beehive Works, Welwyn, Herts.

CLASS 2. Best and most complete STANDARD FRAME HIVE for general use, unpainted.—Premiums, 20s., 15s., and 10s.

- 1st No. 7 E. H. Taylor, Ltd., Beehive Works, Welwyn, Herts.
2nd No. 4 Lindsay & Fenwick, South Street, Perth.
3rd No. 5 Morgan Nature Toy Co., Ltd., Union Glen, Aberdeen.

***CLASS 3.** Best and most complete STANDARD FRAME HIVE for Cottager's use, unpainted, price not to exceed 35s.—Premiums, 20s., 15s., 10s.

- 1st No. 10 E. H. Taylor, Ltd., Beehive Works, Welwyn, Herts.
2nd No. 8 Lindsay & Fenwick, South Street, Perth.
3rd No. 9 R. Steele & Brodie, Bee Appliance Works, Wormit.

* In these Classes reduced prize-money was awarded on account of small entries. (Rule 8.)

CLASS 4. Any NEW APPLIANCE connected with Bee-keeping to which no prize has been awarded at any previous Highland Show.—Premiums, 10s., 5s.

- 1st No. 16 E. H. Taylor, Ltd., Beehive Works, Welwyn, Herts.
 2nd No. 12 E. J. Burt, Stroud Road, Gloucester.
 H No. 13 E. J. Burt, Stroud Road, Gloucester.

HONEY, &c.

The Rosebery Silver and Bronze Medals respectively—awarded by the Scottish Bee-Keepers' Association to the winners of the greatest number of points in Honey Classes, calculated on the following basis :—1st prize, 3 points ; 2nd prize, 2 points ; 3rd prize, 1 point. Winners must be at the time members or affiliated to the Scottish Bee-Keepers' Association.

Thomas Pate, Hopefield, Milnathort.
 L. W. Inglis, 60 Southbrae Drive, Jordanhill, Glasgow.

CLASS 5. Six Sections of COMB HONEY.—Premiums, 20s., 15s., 10s.

- 1st No. 19 L. W. Inglis, 60 Southbrae Drive, Jordanhill, Glasgow.
 2nd No. 21 John Richardson, 19 Spittal Street, Stirling.
 3rd No. 18 T. Gordon & Sons, Torbrex Nurseries, Stirling.

***CLASS 6.** Six Jars of RUN or EXTRACTED LIGHT-COLOURED HONEY, approximate weight, 6 lbs.—Premiums, 20s., 15s., 10s.

- 1st No. 24 D. & J. Lindsay, Park View, Arnside, *via* Carnforth.
 2nd No. 25 John M. Stewart, Mollance Gardens, Castle Douglas.
 3rd No. 23 John C. Finlay, High Monkredding, Kilwinning, Ayrshire.

***CLASS 7.** Six Jars of RUN or EXTRACTED MEDIUM or DARK-COLOURED HONEY, excluding Heather, approximate weight, 6 lbs.—Premiums, 20s., 15s., 10s.

- 1st No. 28 Walter Trinder, Edwinstowe, near Newark, Notts.
 2nd No. 27 D. & J. Lindsay, Park View, Arnside, *via* Carnforth.

***CLASS 8.** Six Jars of PRESSED HEATHER HONEY in liquid form, approximate weight, 6 lbs.—Premiums, 20s., 15s., 10s.

- 1st No. 29 Thomas Pate, Hopefield, Milnathort.

CLASS 9. Six Jars of GRANULATED HONEY, approximate weight, 6 lbs.—Premiums, 20s., 15s., 10s.

- 1st No. 30 John Alexander, Broadiach, Countesswells.
 2nd No. 33 Thomas Pate, Hopefield, Milnathort.
 3rd No. 32 Robert Harper, Broomhill, Botriphine, Keith.

***CLASS 10.** One Shallow Frame of COMB HONEY for extracting purposes.—Premiums, 20s., 15s., 10s.

- 1st No. 36 D. & J. Lindsay, Park View, Arnside, *via* Carnforth.
 2nd No. 34 T. Gordon & Sons, Torbrex Nurseries, Stirling.

CLASS 11. PRODUCTS made with the aid of Honey. Recipe to be attached.—Premiums, 20s., 15s., 10s.

(No entry.)

* In these Classes reduced prize-money was awarded on account of small entries. (Rule 8)

***CLASS 12.** Best display of HONEY in any form staged in space 3 feet by 3 feet, height from table not exceeding 4 feet. Weight of Honey not to exceed 100 lbs.—Premiums, 60s., 30s., 20s.

1st No. 37 Peter M'Pherson, Almond Valley Junction, Dunkeld Road, Perth.

CLASS 13. Best exhibit of not less than 1 lb. of WAX in any form.
Premiums, 20s., 15s., 10s.

1st No. 39 D. & J. Lindsay, Park View, Arnside, *via* Carnforth.

2nd No. 43 Walter Trinder, Edwinstowe, near Newark, Notts.

3rd No. 41 Thomas Pate, Hopefield, Milnathort.

***CLASS 14.** Best exhibit of not less than 1 lb. of WAX made into shape for retail trade and over-counter trade.—Premiums, 20s., 15s., 10s.

1st No. 44 Annie Murray Blair, 67 Gilmore Place, Edinburgh.

2nd No. 45 Miss Rachel Munro, Kennels, Glenrinnies, Dufftown.

3rd No. 46 Thomas Pate, Hopefield, Milnathort.

CLASS 15. OBSERVATORY HIVE with Queen and Bees.
Premiums, 50s., 30s., 15s.

1st No. 48 T. Gordon & Sons, Torbex Nurseries, Stirling.

2nd No. 47 James L. Archibald, 12 Great Western Road, Aberdeen.

3rd No. 50 Thomas Pate, Hopefield, Milnathort.

CLASS 16. EXHIBIT of a scientific nature not mentioned in the foregoing classes, to which no prize has been awarded at any previous Highland Show.—Premiums, 20s., 15s., 10s.

(Not forward.)

CONFINED TO SCOTTISH EXHIBITORS.

CLASS 17. Six Sections of COMB HONEY.—Premiums, 30s., 20s., 10s.

1st No. 53 W. D. Bowden, Bridgeheugh, Selkirk.

2nd No. 56 L. W. Inglis, 60 Southbrae Drive, Jordanhill, Glasgow.

3rd No. 55 T. Gordon & Sons, Torbex Nurseries, Stirling.

***CLASS 18.** Six Jars of RUN or EXTRACTED MEDIUM or DARK-COLOURED HONEY, approximate weight, 6 lbs.—Premiums, 30s., 20s., 10s.

1st No. 61 John Alexander, Broadiach, Countesswells.

CLASS 19. Six Jars of RUN or EXTRACTED LIGHT-COLOURED HONEY, approximate weight, 6 lbs.—Premiums, 30s., 20s., 10s.

1st No. 63 John C. Finlay, High Monkredding, Kilwinning.

2nd No. 66 John M. Stewart, Mollance Gardens, Castle Douglas.

3rd No. 64 Thomas Pate, Hopefield, Milnathort.

V No. 65 John Robertson, 33A Watergate Street, Rothesay.

11 No. 62 John Alexander, Broadiach, Countesswells.

* In these Classes reduced prize-money was awarded on account of small entries. (Rule 8)

WOOL.**PURE BREED CLASSES.****CLASS 1. BLACKFACE WOOL—EWE. Three Fleeces.**
Premiums, £3, £2, and £1.

- 1st No. 4 Andrew D. Hart, Ben Lomond, Rowardennan.
 2nd No. 2 John Stodart Dickson, Flemington, Dolphinton.
 3rd No. 5 Andrew D. Hart, Ben Lomond, Rowardennan.
 H No. 3 Robert Graham, Auchengassel, Twynholm.

CLASS 2. BLACKFACE WOOL—WEDDER. Three Fleeces.
Premiums, £3, £2, and £1.

- 1st No. 15 Andrew D. Hart, Ben Lomond, Rowardennan.
 2nd No. 14 Andrew D. Hart, Ben Lomond, Rowardennan.
 3rd No. 12 James Campbell, Tullich, Killin.

CLASS 3. BLACKFACE WOOL—HOGG. Three Fleeces.
Premiums, £3, £2, and £1.

- 1st No. 22 J. H. Munro Mackenzie, Calgary, Isle of Mull.
 2nd No. 20 Andrew D. Hart, Ben Lomond, Rowardennan.
 3rd No. 21 Andrew D. Hart, Ben Lomond, Rowardennan.
 H No. 18 John Stodart Dickson, Flemington, Dolphinton

CLASS 4. CHEVIOT WOOL—EWE. Three Fleeces.
Premiums, £3, £2, and £1.

- 1st No. 33 Thomas Oliver, Greenbanks, Robertson, Hawick.
 2nd No. 35 R. G. & J. Shiell, Sourhope, Kelso.
 3rd No. 32 James Henderson, Wiltonburn, Hawick.
 H No. 36 The Duke of Sutherland, Dunrobin Home Farm, Golspie

CLASS 5. CHEVIOT WOOL—HOGG. Three Fleeces.
Premiums, £3, £2, and £1.

- 1st No. 41 Jacob Robson, Cold Town, Woodburn, Northumberland.
 2nd No. 40 Thomas Oliver, Greenbanks, Robertson, Hawick.
 3rd No. 43 The Duke of Sutherland, Dunrobin Home Farm, Golspie.
 H No. 42 R. G. & J. Shiell, Sourhope, Kelso.

CLASS 6. BORDER LEICESTER WOOL—EWE. Three Fleeces.
Premiums, £3, £2, and £1.

- 1st No. 45 R. G. Murray & Son, Spittal, Biggar.

CLASS 7. BORDER LEICESTER WOOL—HOGG. Three Fleeces.
Premiums, £3, £2, and £1.

- 1st No. 46 Robert Graham, Auchengassel, Twynholm.
 2nd No. 47 R. G. Murray & Son, Spittal, Biggar.

CLASS 8. HALF-BRED WOOL—EWE. Three Fleeces.
Premiums, £3, £2, and £1.

- 1st No. 49 John C. Brown, Hundalee, Jedburgh.
 2nd No. 48 John C. Brown, Hundalee, Jedburgh.
 3rd No. 50 Thomas Oliver, Greenbanks, Robertson, Hawick.

CLASS 9. HALF-BRED WOOL—HOGG. Three Fleeces.
Premiums, £3, £2, and £1.

- 1st No. 52 John C. Brown, Hundalee, Jedburgh.
2nd No. 51 John C. Brown, Hundalee, Jedburgh.
3rd No. 53 Thomas Oliver, Greenbanks, Robertson, Hawick.

CLASS 10. SHETLAND WOOL—EWE. Three Fleeces.
Premiums, £3, £2, and £1.

- 1st No. 55 Alexander Cowan of Loganhouse, Valleyfield, Penicuik
2nd No. 56 Alexander Cowan of Loganhouse, Valleyfield, Penicuik.
3rd No. 54 Dr J. C. Bowie, Park Hall, Brixter, Shetland.

CLASS 11. SHETLAND WOOL—HOGG. Three Fleeces.
Premiums, £3, £2, and £1.

- 1st No. 58 Alexander Cowan of Loganhouse, Valleyfield, Penicuik.
2nd No. 57 Alexander Cowan of Loganhouse, Valleyfield, Penicuik.

NEW IMPLEMENTS.

The judges having inspected the new implements submitted for competition, have awarded the Society's silver medal to the following:—

Harrison, M'Gregor, & Co., Ltd., Leigh—Patent Knotter Control, as applied to the "Albion" Harvester.

Land Drainage Excavator Co.—"Revolt" Drain Excavator with improvements as compared with the machine exhibited at Aberdeen Show, 1920.

W. N. Nicholson & Sons, Ltd.—(1) Ninetine Universal Cultivator;
(2) Detachable Duplex Self-Lifting Gear for Harrows.

Robertson & M'Laren.—The "Victory" Hay Ricker.

Wallace (Glasgow) Ltd.—2½-3 b.h.p. Stationary Air-cooled Single-sleeve Valve Engine.

JUDGES

Shorthorn.—Captain John M'Gillivray of Calrossie, Nigg, Ross-shire; William Wright, St John's House, Bracebridge Heath, Lincoln.

Aberdeen-Angus and Fat Sheep.—George Duff, West Park, Dufftown, Banffshire; C. F. Tulloch, Braevail, Lethen, Nairn.

Galloway.—David Brown, Stepford, Dumfries; A. H. Fox-Brockbank, The Croft, Kirksanton, Silecroft, Cumberland.

Highland.—J. A. Fletcher, Lauderdale, Strontian, Ardgour, Argyllshire; Donald M'Gregor, Inverchaggernie, Crianlarich.

Ayrshire.—Andrew Wilson, Finlayston, Ochiltree; William Hunter, Templand Mains, Cumnock.

British-Friesian.—John Brown, Haydon Hill, Aylesbury; Alexander Wilson, Thornleypark, Paisley.

Draught Stallions, Entire Colts and Geldings.—William Dunlop, Dunure Mains, Ayr; Scott Wyllie, Milton of Luncarty, Redgorton, Perth; John Hastie, Eddlewood, Hamilton.

Draught Mares and Fillies.—Alexander Clark, Newton, Markinch; John Wilson, Yett, Libberton, Carnwath; James Barrie, Home Farm, Balmedie.

Hunters.—Lieut.-Col. J. M'Kie, D.S.O., Ernespie, Castle Douglas.

Hackneys, Ponies, and Harness Horses.—Alex. Morton, jun., Gowan Bank, Darvel.

Highland Ponies.—Donald MacDonald, Mornish, Killin.

Western Island Ponies.—William Cairns, Glenfinlas, Callander.

Shetland Ponies.—Francis N. M. Gourlay, Milnton, Tynron, Thornhill, Dumfriesshire; David Bow, Rossie, Auchtermuchty.

Blackface Sheep.—Douglas Willison, Acharn, Killin; Andrew D. Mitchell, Westloch, Eddlestone; David Reid, The Crofts, Glenmuick, Ballater.

Cheviot.—Hope W. Hunter, Glenochar, Elvanfoot, Lanarkshire; John MacDonald, Glenbrittle, Portree, Skye.

Border Leicester.—James Butters, Masterton, Dunfermline; William R. Ross, Milton of Culloden, Inverness.

Half-Bred.—Walter J. Grieve, Southfield, Hawick.

Oxford Down.—J. H. Toppin, Musgrave Hall, Skelton, Penrith.

Suffolk.—Herbert E. Smith, Searsons, Trimley, Ipswich.

Shropshire.—John Crowe, Woodhouse, Aldford, Chester.

Goats.—H. S. Holmes Pegler, Coombe Bury House, Kingston Hill.

Large White Pigs.—George Will, The Farm, Crichton Royal, Dumfries.

Middle White and Berkshire.—Edmund Wherry, Bourne, Lincs.

Large Black.—T. F. Hooley, Dry Drayton, near Cambridge.

Gloucestershire Old Spots.—James Peter, Old Vicarage, Berkeley, Glos.

Cumberland.—J. H. Toppin, Musgrave Hall, Skelton, Penrith.

Poultry.—Walter Bradley, Homestall Poultry Farm, East Grinstead (Classes 1 to 12, 17 to 46, 73 to 76, and 81 to 84 inclusive); James Garrow, Edinalee, Loanhead (Classes 13 to 16, 47 to 72, 77 to 80, 85 to 109 inclusive).

Dairy Produce.—Professor R. J. Drummond, Dairy School, Kilmarnock.

Bee Appliances and Honey.—G. W. Avery, 13 George Square, Edinburgh.

Wool.—James King (of R. & A. Campbell), 84 Hyde Park Street, Glasgow.

ATTENDING MEMBERS

SHORTHORN.—*Colonel J. L. Reid, R. A. Smith, P. S. Anderson, A. C. Buchanan, John C. Wilson.*

ABERDEEN-ANGUS AND FAT SHEEP.—*W. A. Dron, R. Paterson, Robert Binnie, James Rodger, John Scrimgeour.*

GALLOWAY.—*A. B. Leitch, Murray Little, Robert Haig, James M'Kenzie.*

HIGHLAND.—*Sir Hugh Shaw Stewart, Bart., C.B., John Dempster, Parlan Macfarlan, Matthew Stark*

AYRSHIRE.—*Thomas Kirk, Peter Dewar, Maurice Malcolm, John W. Prentice.*

BRITISH-FRIESIAN.—*William Carrick, William Bryce, Alex. Y. Allan, James Walls.*

DRAUGHT STALLIONS.—*Charles Douglas, D.Sc., C.B., John Speir, William MacEwan, T. L. Reid, Edward H. Macfarlane; DRAUGHT MARES.*—*William Meiklem, Robert Park, James M'Laren, jun., David M. Aitkenhead, James Stirling.*

HUNTERS.—*Colonel F. J. Carruthers, Sir Kenneth Mackenzie, Bart., Charles D. Ross, Donald M'Laren.*

HACKNEYS, PONIES AND HARNESS HORSES.—*M. S. Thomson, Sir David Wilson, Bart., Hugh Marshall, Captain Lewis, D. Rankin, Major C. Falconer-Stewart, M.C.*

HIGHLAND PONIES.—*R. Macdiarmid, Colonel G. J. Fergusson-Buchanan, T. D. Wallace.*

WESTERN ISLAND PONIES.—*W. P. Gilmour, Alexander Paterson, W. P. Tod.*

SHETLAND PONIES.—*James Grieve, William Edmond, Mrs Marian Waters.*

BLACKFACE.—*John Elliot, Alex. Robertson, James Macfarlane, William M'Laren, John Tod.*

CHEVIOT.—*T. A. Buttar, Alex. Cowan, Robert M'Gee, P. M'Intyre.*

BORDER LEICESTER.—*A. H. Anderson, John Edmond, William Drysdale, Peter Robertson.*

HALF-BRED.—*J. L. Wilson, John W. Dewar, John Thomson.*

OXFORD DOWN.—*Peter Wilson.*

SUFFOLK.—*John P. Sleigh, John Gray, James Paterson.*

SHROPSHIRE.—*Colonel E. C. Bolton, Captain C. Willison.*

GOATS.—*John Fisher, Miss C. E. Aitkenhead, N.D.A., Samuel Bain, jun., Bailie James E. Ronald.*

LARGE WHITE PIGS.—*John Elder, Bailie O. P. Derrick, James King.*

MIDDLE WHITE AND BERKSHIRE.—*Captain J. Kemp Smith, William Peat.*

LARGE BLACK.—*H. B. Marshall, Daniel M'Ewen, John Oswald.*

GLOUCESTERSHIRE OLD SPOTS.—*James Durno, W. Stevenson.*

CUMBERLAND.—*J. T. M'Laren, J. Parker Smith.*

POULTRY.—*Dr J. F. Tocher, W. Watson Murray, Bailie David Moores, James Snodgrass, James Weir.*

DAIRY PRODUCE.—*Lord Forteviot, Provost Robert M'Culloch, Dean of Guild Andrew Buchanan, George I. Campbell, yr. of Succoth.*

BEE APPLIANCES AND HONEY.—*Joseph Tinsley, Charles Brown, C. A. Hamilton, A. Aikman Blair, Gilmore Place, Edinburgh, John W. Moir, 64 Polwarth Terrace, Edinburgh.*

WOOL.—*John Elliot, W. J. Kippen, Alexander Park*

II.—VETERINARY DEPARTMENT.

CLASS EXAMINATIONS, 1921.

Silver Medals were awarded to the following :—

GLASGOW VETERINARY COLLEGE.

Chemistry	Bryce Nairn, Glasgow.
Junior Anatomy	John M'Quaker, Wigtown.
Biology	John Mitchell, Glasgow.
Senior Anatomy	Andrew Cruickshank, Keith.
Physiology	Sydney G. Abbott, Glasgow.
Stable Management	John Somerville, Paisley.
Pathology and Bacteriology	Charles A. M'Gaughey, Partick, Glasgow.
Materia Medica	Charles A. M'Gaughey, Partick, Glasgow.
Hygiene and Dietetics	Charles A. M'Gaughey, Partick, Glasgow.
Medicine and Meat Inspection	Thomas H. Michie, Alva.
Surgery and Obstetrics	Thomas H. Michie, Alva.

11 Large Silver Medals, £12, 13s.

ROYAL (DICK) VETERINARY COLLEGE.

Chemistry	A. Brownlee, Mid-Calder.
Biology	C. E. Hall, Furness Vale.
Junior Anatomy	C. E. Hall, Furness Vale.
Senior Anatomy	R. F. Montgomerie, Rothesay.
Physiology	R. F. Montgomerie, Rothesay.
Stable Management	J. Small, Edinburgh.
Materia Medica	D. Dunbar, Fordyce.
Pathology	D. Dunbar, Fordyce.
Hygiene	D. Dunbar, Fordyce.
Surgery	R. M. C. Gunn, Australia.
Medicine	W. R. Wallace, Aberdeen.

11 Large Silver Medals, £12, 13s.

III.—DISTRICT COMPETITIONS, 1921.

9 Districts—Grants of £12 each (Section I.)	£108	0	0
1 " Grant of £20 (Section I.)	20	0	0
13 " Grants of £15 each	195	0	0
14 " Special Grants, £82; medals, £15, 6s.	97	6	0
Medals for Shows (80 large)	92	0	0
3 " Medals for Cottages, Gardens, &c. (6 Minor)	2	11	0
16 " Medals for Hoeing Competitions, 1920-21	6	8	0
129 " Medals for Ploughing, 1920-21	58	6	10
102 Long Service Certificates, £48, 14s. 9d., and Medals, £64, 11s. 4d. (1920-21)	118	6	1
	<hr/> £692 17 11 <hr/>		

ABSTRACT OF PREMIUMS.

District Competitions	£579	11	10
Long Service Awards	113	6	1
Veterinary Colleges (22 Medals)	25	6	0
	<hr/> £718 8 1 <hr/>		

ABERDEEN SHOW, 1920.

ALTERATIONS IN PRIZE LIST.

On account of animals failing to comply with the Regulations as to calving, foaling, and farrowing, the following changes have taken place in the list of animals for which prizes were awarded:—

CATTLE

ABERDEEN-ANGUS.

CLASS 11. HEIFER, calved on or after 1st December 1917.—
Premiums, £10, £5, £3, and £2.

- 1st No. 119 James Kennedy of Doonholm, Ayr, "Marsala" (62,717).
 * No. 123 Charles Penny, Skillymarno, Strichen, "Pride X. of Stenhouse" (62,867).
 2nd No. 124 Andrew Thomson Reid of Auchterarder House, Auchterarder, "Proud Genesta" (63,263).
 3rd No. 125 Gordon Reid Shiach of Rosebrae, Elgin, "Blackberry of Rosebrae" (63,412).
 4th No. 116 Sir John R. Findlay, K.B.E., Aberlour, "Eventide II. of Castlecraig" (63,338).

BRITISH FRIESIAN.

CLASS 41. HEIFER in Calf, with her first calf to calve before 3 years old.—
Premiums, £10, £5, and £3.

- 1st No. 304 William Sinclair, Loirston, Nigg, Aberdeen, "Kirkhill Nellie VII." (34,296).
 2nd No. 299 Trustees of Roderic and Ian M'Robert, Colney Park, St Albans, Herts, "Douneside Gigha" (28,360).
 * No. 306 Adam Smith, Lochlands, Larbert, "Lochlands Nicol" (34,622).
 3rd No. 310 Major D. A. Spence, V.D., Dunninald Mains, Montrose, "Dunninald Ida" (33,070).

HORSES

DRAUGHT.

CLASS 55. YELD MARE, foaled before 1917.—Premiums, £12, £9, £6, and £4.

- 1st No. 439 F. Calvert & F. J. Dickens Butler, Red Court, Carnforth, Lancashire, "Farleton Lady Alice."
 2nd No. 441 J. & R. Cocker, Hill of Petty, Fyvie, "Sunray" (47,884).
 * No. 446 J. P. Sleight, St John's Wells, Fyvie, "Naila" (49,006).
 * No. 436 George Anderson, West Fingask, Old Meldrum, "Fine Feathers."
 3rd No. 440 George Clyne, Noss House, Wick, "Lady Carmen" (40,632).
 4th No. 445 William Reith, Kennerty Farm, Peterculter, Aberdeenshire, "Verona."

HACKNEY.

CLASS 63. BROOD MARE, over 14 Hands, with Foal at foot, or to foal this season to a registered Sire. Registered in the Hackney Stud Book.—Premiums, £10, £6, and £4.

- 1st No. 496 Sir Lees Knowles, Bart., C. V. O., O. B. E., T. D., Westwood Pendlebury,
"Slashing Dorothy" (23,769).
* No. 497 J. M. Macdonald, Braeraunoch, Inverness, "Albania of Inverness"
(21,201).

PIGS

BERKSHIRE.

CLASS 135. SOW, any age.—Premiums, £8, £4, and £2.

- * No. 958 A. H. Bishop, Thorntonhall, by Glasgow, "Meerbarn B." (22,389).
1st No. 960 W. Howard Palmer, Stokes Farm, Wokingham, Berkshire, "Murrell
Minnie" (21,907).

The animals failing to qualify are marked thus ().*

STATE OF THE FUNDS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY

OF SCOTLAND

As at 30th NOVEMBER 1921

I. INVESTED IN WAR STOCK, HERITABLE BONDS, DEBENTURE AND PREFERENCE RAILWAY STOCKS, BANK STOCKS, &c. . .	£95,155 15 1
II. TEMPORARY LOANS, £1,500 with Edinburgh Corporation . .	1,500 0 0
III. ESTIMATED VALUE of Building, No. 3 George IV. Bridge	£3,100 0 0
IV. ESTIMATED VALUE of Furniture, Paintings, Books, &c.	1,000 0 0
V. ARREARS OF SUBSCRIPTIONS considered recoverable . . .	4,100 0 0
VI. BALANCE at 30th November 1921	144 18 6
	2,141 11 3
AMOUNT OF GENERAL FUNDS	£103,042 4 10
VII. SPECIAL FUNDS—	
TWEEDDALE MEDAL FUND—	
Heritable Bond, at 5½ per cent	£500 0 0
Sum on Deposit Receipt with British Linen Bank . . .	75 0 0
	£575 0 0
FIFE AND KINROSS PERPETUAL CHALLENGE CUP—	
£460 Great Central Railway Co. 3½ per cent Second Debenture Stock, at 53	£243 16 0
Sum on Deposit Receipt with British Linen Bank	31 8 10
	275 4 10
PAISLEY GOLD CUP FUND—	
£802, 8s. 8d. North British Railway Co. 3 per cent Debenture Stock, at 48½	£389 3 6
Sum on Deposit Receipt with British Linen Bank	68 2 7
	457 6 1
RENFREWSHIRE GOLD CUP FUND—	
£668, 14s. 4d. North British Railway Co. 3 per cent Debenture Stock, at 48½	£324 6 6
Sum on Deposit Receipt with British Linen Bank	62 17 9
	387 4 3
WILLIAM TAYLOR MEMORIAL PRIZE FUND—	
£401, 2s. 7d. North British Railway Co. 3 per cent Debenture Stock, at 48½	£194 11 0
Sum on Deposit Receipt with British Linen Bank	52 8 1
	246 19 1
	£1,941 14 8
BALANCES WITH BRITISH LINEN BANK at 30th November 1921 . .	88 5 5
AMOUNT OF SPECIAL FUNDS	£2,029 19 8

DAVID WILSON, *Treasurer.*
HUGH SHAW STEWART, *Chairman of Directors.*
WM. HOME COOK, C.A., *Auditor.*

EDINBURGH, 4th January 1922.

ABSTRACT of the ACCOUNTS of the HIGHLAND and CHARGE.

1. BALANCE as at 30th November 1920	£1068 13 2	
2. ARREARS of Subscriptions outstanding at 30th November 1920	£142 16 6	
Whereof due by Members who have compounded for life, and whose arrears are thereby extinguished	£8 0 0	
Sums ordered to be written off	105 10 6	
	<hr/>	113 10 6
		29 6 0
3. INTERESTS AND DIVIDENDS—		
(1) Interests—		
On Heritable Bonds, less Income-tax	£693 0 0	
On Railway Debenture and Preference Stocks, do.	1,213 17 6	
On Colonial Government Stocks, do.	328 8 10	
On Annuity Stocks, do.	51 16 0	
On Edinburgh Corporation Loans, do.	130 11 8	
On War Stock	619 19 10	
	£3,037 13 10	
(2) Dividends	891 5 10	
	<hr/>	3,928 19 8
4. SUBSCRIPTIONS—		
Annual Subscriptions	£2,099 9 0	
Life Subscriptions	1,766 14 0	
	<hr/>	3,866 3 0
5. 'TRANSACTIONS'—Advertising	73 13 4	
6. INCOME-TAX repaid for year to 5th April 1921	1,420 13 4	
7. RECEIPTS from Aberdeen Show, 1920	904 9 7	
8. RECEIPTS from Stirling Show, 1921	19,809 11 8	
9. REFUND of expenses of experiments in connection with Agricultural Draining Machine	922 3 7	
10. MISCELLANEOUS RECEIPTS	183 13 5	
11. LEGACIES received	600 0 0	
12. TEMPORARY LOANS uplifted	9,250 0 0	
	<hr/>	
SUM OF THE CHARGE	£42,057 11 9	

AGRICULTURAL SOCIETY of SCOTLAND for Year 1920-1921.

DISCHARGE.

1. ESTABLISHMENT EXPENSES—		
Salaries and Wages—Secretary, £1000; Chief Clerk, £600; Second Clerk, £350; 2 Extra Clerks, £68, 10s.; Typist, £180; Messenger, Wages, £167, 10s.; Cleaning, £52; Retiring Allowance, £30		£2,398 0 0
Few-duty, £28; Taxes, £118, 2s. 10d.		141 2 10
Coals, Gas, Electric Light, &c.		74 12 1
Repairs and Furnishings, £90, 12s. 9d.; Telephone and Telegrams, £28, 16s. 5d.; Insurance, £27, 12s. 7d.; Special Annuity Premiums, £85, 16s.		232 17 9
		<u>£2,841 12 8</u>
2. FEE to Auditor of Accounts for 1919-1920 (including £25 increase in Fee for Aberdeen Show)		100 0 0
3. EDUCATION		70 19 10
4. CHEMICAL DEPARTMENT—		
Fee to Chemist	£100 0 0	
Analyses to Members and Expenses	420 8 10	
		<u>520 8 10</u>
5. VETERINARY DEPARTMENT—		
Medals to Students		25 6 0
6. BOTANICAL AND ENTOMOLOGICAL DEPARTMENT		
		25 0 0
7. DAIRY DEPARTMENT—		
Expenses of Examination held at Kilmarnock	£257 1 4	
Less Entry Fees	129 8 0	
		<u>127 18 4</u>
8. SOCIETY'S 'TRANSACTIONS,' 1919		2 17 6
9. SOCIETY'S 'TRANSACTIONS,' 1920		2,072 0 8
10. SOCIETY'S 'TRANSACTIONS,' 1921		2,162 2 10
11. ORDINARY Printing, £286, 2s. 11d.; Advertising, £52, 6s. 3d.; Stationery, Books, &c., £187, 15s. 1d.; Postages, £120; Bank and Post Office Charges, £10, 6s. 7d.		656 10 10
12. SALARY to Consulting Engineer		125 0 0
13. GRANTS to Public Societies		78 3 0
14. MISCELLANEOUS Payments		302 4 6
15. INVESTMENTS made		9,972 2 7
16. PAYMENTS in connection with Aberdeen Show, 1920		309 15 0
17. PAYMENTS in connection with Stirling Show, 1921—		
Premiums, £3025, 10s.; Medals, £31, 4s.; Expenses as per page 389 of Show Account, £14,574, 4s. 8d.		17,680 18 8
18. PREMIUMS and Medals for Local Shows and District Competitions		555 9 0
19. CERTIFICATES and Medals for Long Service		113 3 1
20. EXPERIMENTS with Agricultural Draining Machine	£505 13 1	
Less Received for work done	806 16 0	
		<u>198 17 1</u>
<i>Note.—The above expenditure and also the expenditure for the two previous years has been repaid by the Ministry of Agriculture and the Board of Agriculture for Scotland.</i>		
21. EXPENSES in connection with Tractor Trials at Shrewsbury		37 14 5
22. EXPENSES attending demonstration of Draining Plough at West Browncastle		21 18 3
23. EXPENSES attending Conferences		73 7 4
24. EXTRAORDINARY EXPENDITURE—Donation to Animal Diseases Research Association, £1000; Glasgow Veterinary College, £800		
		1800 0 0
25. ARREARS removed from Subscription List at 30th November 1921		87 11 6
26. ARREARS outstanding at 30th November 1921		144 18 6
27. BALANCES as at 30th November 1921—		
With Royal Bank of Scotland—		
Edinburgh Account	£1745 4 7	
London Account	261 10 0	
		<u>£2,006 14 7</u>
In hands of Secretary	134 16 8	
		<u>2,141 11 5</u>
SUM OF DISCHARGE		<u><u>£42,057 11 9</u></u>

DAVID WILSON, *Treasurer.*

HUGH SHAW STEWART, *Chairman of Directors.*

WM. HOME COOK, C.A., *Auditor.*

ABSTRACT of the ACCOUNTS

CHARGE.

1. LOCAL SUBSCRIPTIONS—			
Donation from Stirling Town Council	.	.	£100 0 0
2. AMOUNT COLLECTED DURING SHOW—			
Gates	.	.	£10,156 1 1
Grand Stand	.	.	1,384 15 1
Catalogues and Awards	.	.	1,008 19 9
Cloak-Rooms and Lavatories	.	.	9 10 4
Rent of Garage and Tickets sold	.	.	163 8 0
Supply Tickets sold	.	.	41 5 0
			<hr/> 12,763 19 3
3. FORAGE SOLD	.	.	20 7 2
4. RENT OF STALLS	.	.	5,924 16 0
5. REFRESHMENT BOOTHS	.	.	145 0 0
6. ADVERTISEMENTS IN CATALOGUE AND PREMIUM LIST	.	.	256 10 6
7. SUBSCRIPTIONS IN AID OF PREMIUMS	.	.	532 10 0
8. TELEPHONE CALLS IN SHOWYARD	.	.	34 17 5
9. INTEREST FROM TEMPORARY LOANS	.	.	31 0 4
10. MISCELLANEOUS	.	.	0 11 0

£19,809 11 8

Notes.—From the above balance of	.	.	£2,178 18 0
Deduct Premiums undrawn at 30th November	.	.	228 15 0
			<hr/> £1,954 18 0
To the above balance there falls to be added sums due by exhibitors for fitting up stands, amounting to	.	.	895 9 5
Making probable surplus	.	.	<u>£2,850 7 5</u>

EDINBURGH, 4th January 1922.

of the STIRLING SHOW, 1921.

DISCHARGE.

1. SHOWYARD—

Fitting up Yard (from which falls to be deducted sums to be received from Exhibitors, as per note on page 388)	£8,500 0 0
Insurance, £17, 10s. ; Rosettes, £72, 16s.	£90 6 0
Penning and Feeding Poultry, £34, 17s. 8d. ; Cartage, £20, 18s.	55 15 8
Railway Carriages, £8, 18s. 9d. ; Tan Bark, £34, 13s. 6d.	43 12 3
Stirling Golf Club, £54, 15s. 9d. ; Rifle Club, £10	64 15 9
Rent of Field, £80 ; Field for Motor Garage, £20	100 0 0
Miscellaneous	4 3 0
Salary to Mr John Reid, Showyard Erector	358 12 8
2. FORAGE for Stock	500 0 0
3. POLICE	497 10 8
4. TRAVELLING EXPENSES of Judges, Stewards, &c.	143 17 3
5. HOTEL AND LUNCHEONS—	315 11 8
Hotel Bills for 23 Directors, 15 Stewards, and 45 Judges	£342 7 8
Luncheons in Showyard for Directors, Judges, Attending Members, Members of Committee, Staff, and Breakfasts and Teas, Rooms, &c.	544 4 10
	886 12 6
6. ASSISTANTS and Attendants	637 4 1
7. PRINTING, Members' Badges, and Stationery	1,640 14 4
8. ADVERTISING and Bill-posting	667 0 10
9. GRANT to Highland Industries	5 0 0
10. FORESTRY EXHIBITION—prizes awarded, £18, 10s. ; special grant, £30	48 10 0
11. VETERINARY INSPECTION	10 10 0
12. CONCERT for Attendants	6 15 0
13. SHOW TREASURER	50 0 0
14. POSTAGES	135 0 0
15. POST OFFICE and Telephones	69 3 8
16. AMBULANCE	7 7 0
17. MISCELLANEOUS PAYMENTS	94 15 0
	£14,574 4 8
18. PREMIUMS drawn at 30th November 1921	3,066 14 0
	£17,630 18 8
BALANCE	2,178 13 0
	£19,809 11 8

DAVID WILSON, *Treasurer.*HUGH SHAW STEWART, *Chairman of Directors.*WM. HOME COOK, C.A., *Auditor.*

ABSTRACT of the ACCOUNTS of the CHARGE.

I. FUNDS as at 30th November 1920—

Amount on Heritable Bond at 5½ per cent	£3,500 0 0
£3,193, 6s. 8d. North British Railway Company 3 per cent Debenture Stock, purchased at	2,650 0 0
£550 Lancashire and Yorkshire Railway Company 3 per cent Debenture Stock, purchased at	611 10 6
£500 Queensland 3½ per cent Inscribed Stock, 1950-70, pur- chased at	450 1 0
£300 Registered 5 per cent National War Bonds, "A" Account, purchased at	300 0 0
£190 London and North-Western Railway Company 4 per cent Guaranteed Stock, purchased at	259 1 11
£200 Temporary Loan with Edinburgh Corporation	200 0 0
	<hr/>
	£7,970 13 5
BALANCE on Account Current with Royal Bank of Scotland	198 18 9
	<hr/>
	£8,169 12 2

II. INTEREST ON INVESTMENTS—

On £3,500 on Heritable Bond for year to Martinmas 1921, at 5½ per cent	£192 10 0
Less tax	57 15 0
	<hr/>
	£134 15 0
On £3,193, 6s. 8d. North British Railway Company 3 per cent Debenture Stock, for year to Martinmas 1921	£95 16 0
Less tax	28 14 10
	<hr/>
	67 1 2
On £550 Lancashire and Yorkshire Railway Company 3 per cent Debenture Stock, for year to 30th June 1921	£16 10 0
Less tax	4 19 0
	<hr/>
	11 11 0
On £500 Queensland 3½ per cent Inscribed Stock, 1950-70, for year to 1st July 1921	17 10 0
On £300 5 per cent Registered National War Bonds, for year to 1st October 1921	15 0 0
On £190 London and North-Western Railway Company 4 per cent Guaranteed Stock, for year to 30th June 1921	£7 12 0
Less tax	2 5 8
	<hr/>
	5 6 4
On £200 Loan with Edinburgh Corporation for year to Martinmas 1921	£9 5 7
Less tax	2 15 7
	<hr/>
	6 10 0
	<hr/>
	257 13 6
III. INCOME-TAX repaid for year to 5th April 1921	98 5 2
	<hr/>
SUM OF CHARGE	£8,520 10 10

ARGYLL NAVAL FUND for the Year 1920-1921.

DISCHARGE.

I. ALLOWANCES to the seven following Recipients—

I. K. D. Hutchison (seventh year)	.	.	.	.	£40 0 0
R. E. S. Hugonin (sixth year)	.	.	.	.	40 0 0
E. C. G. Greenlees (sixth year)	.	.	.	.	40 0 0
J. G. Maclean (sixth year)	.	.	.	.	40 0 0
A. F. Campbell (fourth year)	.	.	.	.	40 0 0
R. A. Forbes (second year)	.	.	.	.	40 0 0
J. A. C. MacGregor (second year)	.	.	.	.	40 0 0
					£280 0 0

II. FUNDS as at 30th November 1921—

Amount on Heritable Bond at 5½ per cent	£3,500 0 0
£3,193, 6s. 8d. North British Railway Company 3 per cent Debenture Stock, purchased at	2,650 0 0
£550 Lancashire and Yorkshire Railway Com- pany 3 per cent Debenture Stock, purchased at	61 10 6
£500 Queensland 3½ per cent Inscribed Stock, 1950-70, purchased at	450 1 0
£300 Registered 5 per cent National War Bonds, "A" Account, purchased at	300 0 0
£190 London and North-Western Railway Com- pany 4 per cent Guaranteed Stock, purchased at	259 1 11
£200 Temporary Loan with Edinburgh Cor- poration	200 0 0
	£7,970 13 5

Note.—The above Funds are entered at cost price. The value at 30th November 1921 was £8232, 17s.

Balance on Account Current with Royal Bank of Scotland	269 17 5	8,240 10 10
	<hr/>	
SUM OF DISCHARGE		£8,520 10 10

DAVID WILSON, *Treasurer.*

HUGH SHAW STEWART, *Chairman of Directors.*

WM. HOME COOK, C.A., *Auditor.*

VIEW OF RECEIPTS AND PAYMENTS

For the Year 1920-1921.

RECEIPTS.

1. ANNUAL SUBSCRIPTIONS AND ARREARS received	£1,946	5	0
2. LIFE SUBSCRIPTIONS	1,766	14	0
3. INTERESTS AND DIVIDENDS—			
Interests	£3,037	13	10
Dividends	891	5	10
			<u>3,928 19 8</u>
4. 'TRANSACTIONS,' Advertising 1919-20			73 13 4
5. INCOME-TAX repaid for year to 5th April 1921			1,420 13 4
6. RECEIPTS in connection with Aberdeen Show, 1920			904 9 7
7. RECEIPTS in connection with Stirling Show, 1921			19,809 11 8
8. REFUND of Expenses of Experiments in connection with Agricultural Draining Machine			922 3 7
9. LEGACIES received			600 0 0
10. MISCELLANEOUS Receipts			183 18 5
			<u>£31,556 8 7</u>

PAYMENTS.

1. ESTABLISHMENT EXPENSES—			
Salaries and Wages	£2,393	0	0
Fou-duty, Taxes, Coals, Gas, Insurance, Repairs and Furnishings	448	12	8
			<u>£2,841 12 8</u>
2. FEE TO AUDITOR of Accounts, 1919-1920 (including £25 increase in Fee for Aberdeen Show)	100	0	0
3. EDUCATION	70	19	10
4. CHEMICAL DEPARTMENT	529	8	10
5. VETERINARY DEPARTMENT	25	6	0
6. BOTANICAL AND ENTOMOLOGICAL DEPARTMENT	25	0	0
7. DAIRY DEPARTMENT	127	18	4
8. SOCIETY'S 'TRANSACTIONS,' 1919	2	17	0
9. Do., 1920	2,072	0	3
10. Do., 1921	2,163	2	10
11. ORDINARY Printing, Advertising, Stationery, Books, Postages, and Bank Charges	656	10	10
12. SALARY to Consulting Engineer	125	0	0
13. GRANTS to Public Societies	78	3	0
14. MISCELLANEOUS Payments	202	4	6
15. PAYMENTS in connection with Aberdeen Show, 1920	309	15	0
16. PAYMENTS in connection with Stirling Show, 1921—			
Premiums	£3,056	14	0
General Expenses	14,574	4	8
			<u>17,630 18 8</u>
17. PREMIUMS AND MEDALS for Local Shows and District Competitions	555	9	0
18. CERTIFICATES AND MEDALS for Long Service	113	3	1
19. EXPERIMENTS with Agricultural Draining Machine	198	17	1
20. EXPENSES in connection with Tractor Trials at Shrewsbury	37	14	5
21. EXPENSES attending Demonstration of Draining Plough at West Browncastle	21	18	3
22. EXPENSES attending Conferences	73	7	4
			<u>£27,961 6 11</u>
23. EXTRAORDINARY EXPENDITURE—Donations	1,800	0	0
			<u>29,761 6 11</u>
			<u>£1,795 1 8</u>

BALANCE OF RECEIPTS £1,795 1 8

DAVID WILSON, *Treasurer.*
HUGH SHAW STEWART, *Chairman of Directors.*
WM. HOME COOK, C.A., *Auditor.*

EDINBURGH, 4th January 1922.

PROCEEDINGS AT BOARD MEETINGS.

MEETING OF DIRECTORS, 6TH APRIL 1921.

Mr DAVID FERRIE of Parbroath, in the Chair.

Present.—*Vice-President*—The Earl of Moray. *Ordinary Directors*—Mr Thomas A. Buttar; Mr Alexander Cowan; Mr Charles Douglas, D.Sc., C.B.; Mr W. A. Dron; Mr David Ferrie; Mr James Grieve; Mr J. E. Kerr; Mr James R. Lumsden; Mr John M'Caig; Mr James M'Queen; Sir Kenneth Mackenzie; Mr Robert Macmillan; Mr William Meiklem; Colonel J. L. Reid; Mr Phipps O. Turnbull. *Extraordinary Directors*—Mr William Carrick; Mr John Edmond; Mr John Elliot; Mr R. Macdiarmid; Mr Hugh Martin; Mr Robert Park; Mr Robert Paterson; Mr Alexander Robertson. *Consulting Engineer*—Professor R. Stanfield. *Chemist*—Dr J. F. Tocher. *Hon. Treasurer*—Sir David Wilson, Bart.

Stirling Show, 1921.

Catering in Showyard.—A Minute of Meeting of Catering Committee, dated 16th March, was read and approved. The Minute recommended that the four licensed catering stands in the Showyard be placed in the hands of the following: Mr John Mitchell, Royal Athenæum, Aberdeen; Messrs Thomas White (Restaurateurs), Ltd., Glasgow; Messrs Alex. Fairley & Son, Edinburgh; Messrs William & R. S. Kerr, Glasgow. The Tea Stand would again be in the hands of Mr John Henderson, Aberdeen. The British Women's Temperance Association would, as usual, have an unlicensed refreshment stand.

Contract for Timber.—A Minute of Meeting of Special Show Contract Committee, dated 16th March, was submitted and approved.

The Minute recommended the acceptance of an offer from Messrs George Gordon & Co., Aberdeen, to hire the necessary timber for the Showyard for a sum of £3325.

Judge of Blackface Sheep.—A letter was read from Mr J. A. Macdonald, Ullar, Aberfeldy, asking leave to resign his appointment as a judge of Blackface Sheep on the present occasion. It was agreed that the resignation be accepted, and that the first reserve, Mr D. Willison, Acharn, Killin, be invited to act.

Harness Classes.—The SECRETARY reported that Mr William S. Miller of Balmanno Castle, who had promised to raise a sum of £110 for additional classes for horses in harness, had now intimated that the response to his appeal for subscriptions had been so good that he had raised a sum of £120, together with a Special Champion Prize of £5 from the Hackney Horse Society. The allocation of the additional amount would be seen from the Prize List, which was laid on the table.

Attending Members.—The following Directors were appointed as Attending Members: *Shorthorn*—R. A. Smith and Colonel J. L. Reid; *Aberdeen-Angus*—W. A. Dron and R. Paterson; *Galloway*—Murray Little and A. B. Leitch; *Highland*—Sir Hugh Shaw Stewart, Bart., C.B.; *Ayrshire*—Thomas Kirk; *British Friesian*—William Carrick; *Draught Stallions*—Charles Douglas, D.Sc., C.B., and John Speir; *Mares*—William Meiklem and Robert Park; *Hunters*—Colonel F. J. Carruthers and Sir Kenneth Mackenzie, Bart.; *Hackneys, Ponies, and Harness Horses*—Sir David Wilson, Bart., and Moffat S. Thomson; *Highland Ponies*—R. Macdiarmid; *Western Island Ponies*—W. P. Gilmour; *Shetland Ponies*—James Grieve; *Sheep, Blackface*—John Elliot and Alexander Robertson; *Cheviot*—Alexander Cowan and T. A. Buttar; *Border Leicester*—A. H. Anderson and John Edmond; *Half-Bred*—J. L. Wilson; *Oxford Down*—Major D. A. Spence; *Suffolk*—John P. Sleigh; *Shropshire*—Colonel E. C. Bolton; *Goats*—John Fisher; *Pigs (Large White)*—John Elder; *Middle White and Berkshire*—Captain J. Kemp Smith; *Large Black*—H. B. Marshall; *Gloucestershire Old Spots*—James Durno; *Cumberland*—J. T. M'Laren; *Poultry*—W. Watson Murray and Dr J. F. Tocher; *Dairy Produce*—Lord Forteviot and Provost Robert M'Culloch; *Wool*—John Elliot.

Local Committee.—The SECRETARY reported that, at a meeting of Local Directors held at Stirling on 17th March, members of the Local Committee of Management from the Stirling Show Division had been appointed.

Casares Junior Challenge Cup.—The SECRETARY reported that Mr E. R. Casares, jun., had cordially agreed to the suggestion made at last meeting, that the conditions of the Cup be amended so as to admit to competition bulls calved on and after 1st April of the year preceding the year of the Show.

Free Stands.—It was agreed to grant the Scottish Farm Servants' Union a site for a stand with a 30-feet frontage, and the Scottish Agricultural Organisation Society a 10-feet stand in Section VI., free of charge.

Carriage of Stock, &c., by Sea.—A letter was read from the North of Scotland, &c., Steam Navigation Co., stating that it was usual for them to carry Stock, &c., returning from the Show at half fares, and to make no charge for the necessary fodder for stock. They were willing to continue this arrangement, but regretted they could not see their way to carry men in charge of stock free of charge.

Special Prizes.—The following special prizes were accepted and votes of thanks accorded to the donors:—

- (1) *British Berkshire Society.*—Champion Prize of £10 for the best animal in the Berkshire Classes.
- (2) *British Goat Society.*—£5 towards the prizes in the Goat Classes.

"Grass Sickness" in Horses.

A letter from the Board of Agriculture for Scotland, dated 5th April, was read, intimating that the Board were prepared to make a grant of an amount equal to one-half of the net expenditure incurred in connection with the investigation during the ensuing year. The total amount of the grant should not exceed £500, and it was offered subject to conditions detailed in the letter.

The CHAIRMAN said it would be recalled that an application had been made to the Board for a grant of £500 towards the expenses of the investigation during the current year, the intention being that a like amount should be provided by the Society and certain local Societies.

It was agreed to accept the offer by the Board of Agriculture, and to inform the Board that the date from which the period of one year during which the grant would be available should run from 1st May 1921.

Dumfries Show, 1922.

The date of the Dumfries Show was fixed for Tuesday, Wednesday, Thursday, and Friday, 25th, 26th, 27th, and 28th July 1922.

Draining Plough.

The following Report by the Implement Committee on the Draining Plough, invented by Mr Thomas Pate, West Browncastle, Strathaven, was submitted and approved:—

"In accordance with the Motion passed at the Meeting of Directors on 2nd March 1921, the following Committee, Mr David Ferrie, Mr Phipps O. Turnbull, Sir Kenneth Mackenzie, Mr C. M. Douglas, Mr James M'Laren, Professor Stanfield, and Mr Stirling, visited the farm of Mr Thomas Pate, West Browncastle, Strathaven, on Friday, 18th March, and witnessed a demonstration of a Draining Plough, designed and used by him.

"The demonstration took place on a wet stony moorland, with a clayey subsoil; heavy rain had fallen early in the morning, so that the conditions were somewhat unfavourable.

"The draining plough had been constructed from an ordinary swing plough, and the essential features appear to be embodied in the shape, set, and length of the mould-board, and the type of sock used. The main part of the mould-board varies in width from 10 to 12 inches—the wider part being at the top—and it is about 42 inches in total length. At the outer extremity of the mould-board there is a separate piece—about 16 inches long—which can be adjusted so as to suit the depth of the drain; the object being to deliver the excavated material as far as possible from the drain, so as to prevent it from falling in again.

"Three socks are provided of widths varying from 12 inches to 8 inches. The socks are somewhat flat in shape, and the outer edge of the "feather" is turned up to form a vertical cutter, about 4 inches in height.

"When the Committee arrived on the ground it was found that preliminary cuts had been made for several drains, each cut being about 6 inches deep. These may be made by an ordinary swing plough or by the draining plough. A cut was then

made with the draining plough, fitted with the widest sock. This carried the depth to about 15 inches. Afterwards the plough was fitted with a narrower sock and another cut made, which gave a total depth of about 22 inches. Before laying the tiles, a further spade's depth is taken out by hand.

"Three horses were used for drawing the plough; one horse is supposed to walk in the drain, but at the demonstration this animal appeared to be severely handicapped in that position.

"Having in view the considerable tractive effort required, it is possible that a tractor would be more suitable. An attempt was made to draw the plough by means of a 'Fordson' tractor, but unfortunately it broke down while cutting the first furrow, and the Committee were compelled to leave before it could be again started.

"There is no doubt that the plough, as designed and worked by Mr Pate, is quite capable of excavating a drain of about 22 inches in depth, but it is evident that some improvements will require to be made before the plough can be placed in the hands of an ordinary ploughman, who may not possess the enthusiasm and skill of the designer.

"At the demonstration, the plough was manipulated by Mr Pate, jun., who was able, from his experience, to attain remarkable results; but it was obvious that he had an arduous task in controlling the plough, and it was noticed that there was a tendency for some of the excavated material to fall back into the drain. This was due to the fact that the mould-board failed to deliver the material far enough from the cutting, but this is a defect that might be overcome in future implements.

"The narrow leading wheel tended to sink in the soft ground and thus to arrest the progress of the plough.

"The device is ingenious, and it appears to have possibilities of improvement, which may result in the production of a labour-saving implement, provided alterations can be effected to render the plough easier of manipulation.

"6th April 1921."

Committee on Local Rating.

The CHAIRMAN stated that a Committee, of which two of the Directors were members, had been appointed to inquire into the incidence of local rating. The present inquiry was on a more restricted basis than that held in 1888, when the Society submitted evidence. It was a question for the Directors to decide whether or not they desired to offer evidence on the present occasion.

On the motion of Sir DAVID WILSON of Carbeth, Bart., it was agreed to remit the matter to the Law and Parliamentary Committee for consideration and report.

Ploughing Matches.

Some discussion took place on a report by the Secretary as to an irregularity in connection with the award of the Society's medal for a ploughing competition, in respect that the member who signed the report was not present at the match. It was agreed that a circular be issued to all Ploughing Societies, calling attention to the occurrence of such irregularities, and pointing out that any Ploughing Society infringing this Society's regulations will be liable, at the discretion of the Board of Directors, to be debarred from receiving medals in future.

MEETING OF DIRECTORS, 4TH MAY 1921.

Mr DAVID FERRIE of Parbroath, in the Chair.

Present.—Ordinary Directors—Mr Alexander Cowan; Mr David Ferrie; Mr James Grievie; Mr Thomas Kirk; Mr Andrew B. Leitch; Mr James R. Lumsden; Mr James M'Laren; Mr J. T. M'Laren; Captain Robert Macmillan; Mr James M'Queen; Mr William Meiklem; Mr R. A. Smith; Mr John Speir; Mr Moffat S. Thomson; Mr Phipps O. Turnbull. *Extraordinary Directors*—Colonel Edwin Bolton; Mr William Carrick; Mr John Edmond; Mr James Elder; Mr John Elliot; Mr Murray Little; Major J. Kemp Smith; Mr J. L. Wilson. *Hon. Secretary*—Mr Charles Douglas, D.Sc., C.B. *Consulting Engineer*—Professor R. Stanfield. *Chemist*—Dr J. F. Tocher. *Hon. Treasurer*—Sir David Wilson, Bart. *Auditor*—Mr William Home Cook, C.A.

The late Colonel R. G. Wardlaw Ramsay.

The CHAIRMAN referred in sympathetic terms to the death of Colonel R. G. Wardlaw Ramsay of Whitehill, and submitted a resolution expressing the regret of the Directors at his death, and their appreciation of his services to the Society as a Director and as a Vice-President. The resolution was unanimously adopted, the Directors present upstanding, and the Secretary was instructed to forward a copy to the relatives of the deceased.

Dangerous Drugs Act, 1920.

A letter was read from the Secretary of the Committee appointed by the Home Office to consider the Draft Regulations under the Dangerous Drugs Act, 1920, stating that a meeting of the Committee was to be held on Friday, 6th May, and inviting the Society to send a representative to the meeting if it was desired to add anything to the representations already made.

The CHAIRMAN reminded the Directors that in March last they had made certain representations to the Home Office with regard to the proposed Regulations. He did not suppose they had anything to add to these representations, but they were, of course, unaware to what extent their representations had been given effect to in the new Draft Regulations.

After discussion, it was decided that Dr Tocher, Consulting Chemist, should represent the Society at the proposed meeting of the Committee on 6th May, and that Lord Balfour of Burleigh be also asked to give his assistance in the matter.

Stirling Show, 1921.

Applications for Free Stands.—A Minute of Meeting of Shows Committee, dated 4th May, was read and approved.

The Minute recommended that free stands be granted as follows: *Animal Diseases Research Association*—10 feet in Section 6. *Lord Roberts' Memorial Workshops*—10 feet in Section 6. *Ministry of Labour, Industrial Training Department*—An open space for exhibition of Hen-houses, &c.

Shropshire Sheep.—The SECRETARY reported that Mr A. S. Berry, who had been appointed Judge of Shropshire Sheep, had recently died, and that Mr John Crowe, who was reserve, had been appointed in his place, and had agreed to act.

Centenary Show.

Mr CHARLES DOUGLAS, D.Sc., C.B., of Auchloch, said that next year was the hundredth anniversary of the first Show of the Society, which was held in the year 1822. He moved that it be remitted to the Shows Committee to consider and report as to whether any, or what, steps should be taken to mark the occasion, and this was unanimously agreed to.

Long Service Awards, &c.

A Minute of Meeting of Shows Committee, dated 4th May, was submitted and approved.

The Minute recommended:—

Long Service Awards.—That no change be made in the present system of awarding the Society's Long Service Certificates and Medals. Apart from the financial outlay entailed in the proposed changes, which would be considerable, there were serious obstacles to introducing any change in the system of these awards. For example, to lower the minimum period of thirty years' service to twenty-five would certainly entail dissatisfaction on the part of the 800 present holders of the Certificate and Medal. Further, the Committee were not aware that there was any general demand for a change, or that any general dissatisfaction existed with regard to the present system of awards.

Applications for Grants.—(1) *Northern Counties Joint Show*—That if the £12 grant given to the Inverness Farmers' Society for the current year is made available for the Northern Counties Joint Show at Inverness, this Society increase the grant to £20, or, alternatively, give six Medals for the Joint Show. (2) *Skye Agricultural Society*—That three Medals be given for award at the Show to be held this year by the Skye Agricultural Society.

Law and Parliamentary Committee.

A Minute of Meeting of Law and Parliamentary Committee, dated 4th May, was read and approved.

The Minute dealt with the following matters :—

Committee on Local Rating.—The Committee had considered the remit from the Board as to the giving of evidence before the Committee on Local Rating, and recommended that the matter be continued in their hands for further consideration at a later date.

Docking of Horses Bill.—The Committee had considered the draft of the Docking of Horses Bill, 1921, together with a communication thereanent from the Shire Horse Society, and recommended that the Directors oppose the passing of the Bill, and that a circular letter be drawn up and issued to all Scottish members of Parliament on the subject. It was further recommended that Mr James Lennox, Redhills, Crieff, be asked to represent the views of the Directors before the Scottish Members Committee of the House of Commons.

Importation of Canadian Cattle.—A letter had been submitted to the Committee from Mr T. B. Turner, Secretary of the Royal Agricultural Society of England, inviting the Society to appoint a delegate to attend a meeting of representatives of Breed Societies, County and Principal Agricultural Societies, Chambers of Agricultural and other Societies interested, in London, on 2nd May, for the purpose of preparing a case for presentation to the Royal Commission. The SECRETARY reported that, after consultation with the Chairman of Directors, he had written in reply that the Chairman did not feel justified in nominating a delegate to attend the meeting, but that the matter would be laid before the Directors at their meeting on 4th May.

Examiners for the National Diploma in Agriculture.

A letter was submitted from the Secretary of the National Agricultural Examination Board, containing a recommendation by that Board that the Highland and Agricultural Society of Scotland and the Royal Agricultural Society of England remove the restriction which now prevents those actually engaged in teaching Agriculture from acting as Examiners for the National Diploma.

Mr CHARLES DOUGLAS moved that the recommendation of the National Agricultural Examination Board be agreed to. The appointment as Examiners of persons actually engaged in the teaching of agriculture was prevented by a resolution adopted by the Royal Agricultural Society and the Highland and Agricultural Society in the year 1906. He detailed briefly the reasons which led the members of the Board to consider that that resolution might now safely be departed from without endangering the maintenance of the practical character of the examination.

Sir DAVID WILSON, Bart., of Carbeth, seconded approval of the recommendation, and this was unanimously agreed to.

Agricultural Diplomas.

A letter was read from the Agricultural Education Association forwarding a resolution of that body as to the appointment of a larger body to supervise all Agricultural Diploma Examinations, and suggesting that a Conference be held on the subject.

On the motion of the CHAIRMAN, the letter was remitted to the Education Committee for consideration and report.

MEETING OF DIRECTORS, 1st JUNE 1921.

Mr DAVID FERRIE of Parbroath, in the Chair.

Present.—*Vice-President*—Mr John J. Moubray of Naemoor. *Ordinary Directors*—Mr T. A. Buttar; Mr Alexander Cowan; Mr W. A. Dron; Mr James Durno; Mr David Ferrie; Mr Alexander Forbes; Mr W. P. Gilmour; Mr James Grieve; Mr J. E. Kerr; Mr Thomas Kirk; Mr James R. Lumsden; Mr John M'Caig; Mr James M'Laren; Mr J. T. M'Laren; Mr James M'Queen; Mr H. B. Marshall; Major D. A. Spence; Mr Phipps O. Turnbull. *Extraordinary Directors*—Mr William Carrick; Colonel F. J. Carruthers; Mr John Edmond; Mr James Elder; Mr John Elder; Mr John Elliot; Mr Murray Little; Provost Robert M'Culloch; Mr Robert Park; Mr Alexander Robertson; Mr J. P. Sleigh. *Hon. Secretary*—Mr Charles Douglas, D.Sc., C.B. *Consulting Engineer*—Professor R. Stanfield. *Chemist*—Dr J. F. Tocher. *Hon. Treasurer*—Sir David Wilson, Bart.

The late Mr P. B. M'Intyre.

Before proceeding with the business of the Meeting, the CHAIRMAN referred to the death of Mr P. B. M'Intyre, Findon Mains, Conon Bridge, a former Director of the Society, and moved that a resolution be engrossed in the Minutes expressing the deep regret with which the Directors received intimation of his death, and their sense of the valuable services rendered by him to the Society.

The Resolution was unanimously adopted, the members present upstanding, and the Secretary was instructed to send an extract thereof to Mrs M'Intyre.

Letters.

The late Colonel R. G. Wardlaw Ramsay.—A letter was read from Mrs Wardlaw Ramsay, in which she thanked the Directors for their expression of sympathy and their appreciation of the services of the late Colonel Wardlaw Ramsay as a Director and as a Vice-President of the Society.

Scottish Meteorological Society.—A letter was submitted from Mr E. M. Wedderburn, W.S., thanking the Society for a donation of £20 to the funds of the Scottish Meteorological Society.

Skye Agricultural Society.—A letter was submitted from the Secretary of the Skye Agricultural Society conveying the thanks of that Society for the award of Silver Medals for competition at their forthcoming Show.

Stirling Show, 1921.

Attending Members.—It was reported that, at a Meeting of the Local Committee at Stirling on 12th May, Attending Members had been appointed on the various Classes of Stock.

New Implements.—On the motion of Mr P. O. Turnbull, Convener of the Implements Committee, the following were appointed to act as Judges of New Implements—viz., Mr A. B. Leitch, Inchstelly, Alves, Forres; Mr G. B. Shields, Dolphingstone, Tranent; and Mr John Speir, Newton Farm, Newton, Glasgow.

Restrictions on Removal of Stock.—The SECRETARY explained the present position under the Regulations issued by Local Authorities in Scotland with regard to the removal of Stock into their respective areas. According to these, Stock from England could be sent to Stirling under Declaration and Licence, the procedure being similar to that under the Swine Fever Order, 1908. He asked the Directors to authorise him to say to Exhibitors entering Stock from England that, in the event of any change occurring in the Regulations which would prevent their Stock being sent forward to Stirling, the entry fees would be returned. The Directors agreed to give the desired authority.

Inverness Show, 1923.

A letter was submitted from the Town Clerk of Inverness, stating that the Town Council of Inverness had agreed to grant the use of the Victoria Park for the Show of 1923, and had remitted to the Parks Committee to consider and report what part of the Park, if any, should be reserved.

Docking of Horses Bill, 1921.

The CHAIRMAN reported that after the Law and Parliamentary Committee had taken certain steps with reference to the above Bill, including the preparation of a letter to the Scottish Members of Parliament, a communication had been received intimating that the promoters of the Bill in the House of Commons had decided to withdraw it.

Dangerous Drugs Act (1920) Regulations.

Dr J. F. TOCHER, Consulting Chemist, reported as to what took place at the Meeting in London on 6th May, when he gave evidence, on behalf of the Society, before the Dangerous Drugs Committee at the Home Office. (See statement by Dr Tocher at Half-yearly General Meeting of this date, page 417.)

Agricultural Diplomas.

A Minute of Meeting of Education Committee, dated 1st June, was submitted and approved.

The Minute recommended that the letter from the Agricultural Education Association, dated 2nd May, and accompanying resolution, be referred for consideration and report to the National Agricultural Examination Board, this procedure being considered desirable in order to secure uniformity of action by the two Societies.

Potato-Diggers.

The SECRETARY reported that he had received a letter, dated 4th May, from the Scottish Potato Trade Executive, in which it was suggested that the Society should inaugurate a competition as an inducement to inventors to produce a digger which would dig and gather potatoes. In reply to that letter, he had written pointing out that the Directors had fully considered the question of improvements in potato diggers, and the desirability of holding a trial, but had decided that no advantage would be obtained from holding such a trial at present. The object of a trial was to determine which type of machine, of several types available, was the most suitable for the work. No new types of potato-diggers had been introduced, so far as was known, into this country since the last trials were held at Turnhouse in the year 1911. The Directors had considered the introduction of American machines of the "Hoover" type, but were convinced that these machines would not give satisfactory results under the conditions of soil and climate usually obtaining in this country. What appeared to be necessary was not so much a trial as that some inducement should be offered to inventors to apply their minds to the production of a new and improved type of potato-digger.

Mr P. O. TURNBULL, Convener of the Implements Committee, said the Secretary's letter correctly stated the present position. There was no doubt that a big demand existed for an efficient and labour-saving implement of this type, and if any new machine was produced the Society would be prepared to hold a trial or demonstration.

New Members.

The SECRETARY reported that there was a list of 348 candidates for election as members of the Society at the Half-yearly General Meeting to be held that afternoon.

Botanist's Report.

Mr JAMES ELDER said that the report by the Society's Botanist on the testing of samples of seeds was unnecessary and should be discontinued. There was now an official Seed Testing Station, and this was duplicating the work.

On the motion of Sir DAVID WILSON, Bart., of Carbeth, it was agreed to remit the matter to the Science Committee for consideration and report.

MEETING OF DEPUTATION OF DIRECTORS HELD IN SHOWYARD,
STIRLING, 27TH JULY 1921.

Mr DAVID FERRIE of Parbroath, in the Chair.

Present.—*Vice-President*—General Archibald Stirling of Keir. *Ordinary Directors*—Mr Thomas A. Buttar; Mr Alexander Cowan; Mr W. A. Dron; Mr James Durno; Mr David Ferrie; Mr W. P. Gilmour; Mr James Grieve; Mr J. Ernest Kerr; Mr James R. Lumsden; Mr John M'Caig; Sir Kenneth Mackenzie, Bart.; Mr James M'Laren; Mr J. T. M'Laren; Mr Robert Macmillan; Mr James M'Queen; Mr William Meiklem; Colonel John L. Reid; General Sir Walter Charteris Ross; Mr R. A. Smith; Mr John Speir; Sir Hugh Shaw Stewart, Bart., C.B.; Mr Moffat S. Thomson; Mr Phipps O. Turnbull. *Extraordinary Directors*—Mr A. H. Anderson; Colonel Edwin Bolton; Mr William Carrick; Colonel F. J. Carruthers; Mr John Edmond; Mr James Elder; Mr John Elder; Mr John Elliot; Mr Murray Little; Provost Robert M'Culloch; Mr R. Macdiarmid; Mr Hugh Martin; Mr Robert Park; Mr Robert Paterson; Mr Alexander Robertson; Mr John P. Sleigh; Captain James Kemp Smith. *Hon. Secretary*—Mr Charles Douglas, D.Sc., C.B. *Hon. Treasurer*—Sir David Wilson, Bart. *Consulting Engineer*—Professor R. Stanfield.

Protests.

The CHAIRMAN stated that no Protests had been lodged.

Precepts.

The Chairman was authorised to sign the Precepts for the prizes awarded at the Stirling Show.

Grant to Ambulance Association.

It was decided that a donation of £7, 7s. be given to the funds of the local branch of the St Andrew's Ambulance Association, in view of services by members of that Association within the Showyard.

Publications.

Authority was given for the issue of Precepts in payment of fees to writers of articles in the current volume of 'Transactions'—the amount of these payments to be settled by the Publications Committee at a meeting next day. (The amount, as subsequently ascertained, was £208, 15s.)

MEETING OF DIRECTORS, 2ND NOVEMBER 1921.

Mr DAVID FERRIE of Parbroath, and afterwards Sir HUGH SHAW STEWART, C.B., of Greenock and Blackhall, Bart., in the Chair.

Present.—Ordinary Directors—Mr James Durno; Mr David Ferrie; Mr W. P. Gilmour; Lieut.-Col. W. T. R. Houldsworth; Mr J. Ernest Kerr; Mr Thomas Kirk; Mr Andrew B. Leitch; Mr James R. Lumsden; Mr James M'Laren; Mr J. T. M'Laren; Mr Robert Macmillan; Mr James M'Queen; Mr H. B. Marshall; Mr William Meiklem; Colonel John L. Reid; Mr Alexander Robertson; Mr John P. Sleigh; Mr John Speir; Major Mark Sprot; Sir Hugh Shaw Stewart, Bart., C.B.; Mr Phipps O. Turnbull; Mr George Will. *Extraordinary Directors*—Mr Alexander Cowan; Colonel F. J. Carruthers; Major C. R. Dudgeon; Mr John Elliot; Mr F. N. M. Gourlay; Mr John M'Caig; Mr J. G. M'Myn; Mr Hugh Martin; Mr Robert Park; Mr R. Jardine Paterson; Mr James Phillips; Mr William Poole, J.P.; Mr G. Bertram Shields; Mr Moffat S. Thomson. *Hon. Secretary*, Mr Charles Douglas, D.Sc., C.B. *Hon. Treasurer*—Sir David Wilson, Bart. *Consulting Engineer*—Professor R. Stanfield. *Consulting Chemist*—Dr J. F. Tocher.

'The late Major D. A. Spence.

Before proceeding with the business of the Meeting, the CHAIRMAN made sympathetic reference to the death of Major David A. Spence, V.D., who was a Director of the Society. Farming on a very large scale, he was specially gifted in organising ability, skilled in all practical matters connected with the management of land, and a trusted adviser in agricultural and other affairs. From his unique knowledge and kindly ways, he had proved himself a valuable colleague whose loss they deeply regretted.

The late Lord Balfour of Burleigh.

The CHAIRMAN referred, in sympathetic terms, to the death of the Right Honourable Lord Balfour of Burleigh, one of the Vice-Presidents of the Society, and who, on a former occasion, occupied the position of President. He said his devotion to Scottish interests and his services to the nation at large were outstanding. Amongst his many activities, he still found time to take a great interest in the affairs of this Society. His loss they deeply deplored. His passing was the passing of a great Scotsman.

The late Alexander Cross of Knockdon.

The CHAIRMAN then referred to the great loss the Society had sustained through the death of Mr Alexander Cross of Knockdon. For more than a quarter of a century Mr Cross was intimately identified with the Society. He was continuously a Director from 1894 onwards, Chairman of Directors from 1908 to 1910, and Honorary Secretary of the Society from 1914 to 1920. Mr Cross had extensive business connections and numerous farming and other interests, but no personal engagements ever prevented his regular attendance at all Meetings of the Society. He played a great part in every department of the Society's work, especially in agricultural education and dairying. He was a pioneer in all things which made for agricultural advancement; but he would be best remembered by all classes for his upright character, his charming personality, his kindness and charity of disposition.

Appropriate resolutions of regret and sympathy were submitted and approved, the members present upstanding, and the Secretary was instructed to forward copies to the relatives of the deceased.

Chairman of the Board for 1921-1922.

On the motion of the Chairman, Mr DAVID FERRIE of Parbroath, seconded by Mr CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart., was unanimously elected Chairman of the Board for the ensuing year.

Sir HUGH SHAW STEWART, on taking the Chair, thanked the Directors for the honour they had done him.

On the motion of Sir HUGH SHAW STEWART, a cordial vote of thanks was accorded to Mr David Ferrie for his services to the Society as Chairman of the Board of Directors for the past two years.

Mr FERRIE suitably acknowledged and thanked the Board and Chairman for the expression of appreciation of his services.

Representatives on other Bodies.

The following were appointed representatives of the Society on the Boards of the undernoted institutions for the ensuing year—viz.: *Board of Scientific Societies*—Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow. *Edinburgh and East of Scotland College of Agriculture*—John Stirton, Secretary, Highland and Agricultural Society. *West of Scotland Agricultural College*—Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart., Ardgowan, Greenock; John M'Caig of Belmont, Stranraer. *Aberdeen and North of Scotland College of Agriculture*—Dr J. F. Tocher, 41½ Union Street, Aberdeen. *Royal (Dick) Veterinary College*—Captain Thomas Kirk of Abbeymains, Haddington. *Glasgow Veterinary College*—James R. Lumsden of Arden, Dumbartonshire. *Scottish Milk Records Association*—John M'Caig of Belmont, Stranraer; Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart.; Robert Park, Brunstane, Portobello.

Letters.

The following letters were submitted:—

Mrs Macintyre, Findon, Conon Bridge.—Thanks for Minute of sympathy.

Sir Thomas Cross, Langbank.—Thanks for wreath and attendance of representatives of Society at funeral of his brother, the late Mr Alexander Cross.

Highland Reel and Strathspey Society.—Thanks for use of Society's Hall.

Animal Diseases Research Association.—Thanks for free stand at Stirling Show.

British Women's Temperance Association—Stirling Branch.—Sending a cheque for £10 as a donation to the funds of the Royal Scottish Agricultural Benevolent Institution. The SECRETARY intimated that this cheque had been handed over to the Secretary of the Institution.

Vacancy on Board.

It was agreed to remit to the three Ordinary Directors for the Aberdeen Division to bring forward, at next meeting, the name of a Director to fill the place of the late Major D. A. Spence of Conveth Mains.

Stirling Show, 1921.

Accounts.—A Summary of the Accounts of the Stirling Show was submitted, showing a probable credit balance of about £2244. This was subject to certain payments due to the Society being received.

List of Awards.—The Lists of Awards for Stock and also for New Implements were laid on the table.

Stirling Miniature Rifle Club.—A letter was read from the Secretary of the Stirling Miniature Rifle Club asking for a donation to the Club's funds. It was explained by the Consulting Engineer that the building on the Show-ground containing the Club's range had been found extremely useful by the Showyard Erector.

On the motion of Mr JAMES M'LAREN, Cornton, it was unanimously agreed that a donation of £10 be given.

Dumfries Show, 1922.

Date of Show.—A letter was submitted from the Scottish Agricultural Implement Dealers' Association containing a representation that the date of the Show should be altered to the original date, the third week of July, leaving one clear week between the termination of the Royal Show and the commencement of this Society's Show, and so as not to clash with other shows in England. It was explained that the

Shows Committee had considered the matter and had agreed to recommend that the proposed change be made.

Mr JAMES M'LAREN, Cornton, moved, and Mr WILLIAM POOLE seconded, that the date of the Show be altered to 18th to 21st July, and this was agreed to.

Forage.—The Secretary was instructed to advertise for tenders for the supply of forage, and the following Committee was appointed to consider the tenders and report to the Board: Mr Hugh Martin, *Convener*, Mr David Ferrie, Mr Alexander Forbes, Mr W. P. Gilmour, Mr John M'Caig, Mr James M'Laren, Mr Alexander Robertson, Mr P. O. Turnbull, and Mr George Will.

Hotel Accommodation and Catering in Showyard.—It was remitted to the Chairman of the Board, the Chairman of the Shows Committee, the Convener of the Local Committee, the Steward of Catering, and the Secretary to make the necessary arrangements.

Mr JOHN M'CAIG of Belmont stated that the luncheon accommodation at the Stirling Show was totally inadequate, and hoped that some better provision would be made at Dumfries. In the discussion which followed, some suggestions were made which, the Chairman said, would receive the careful consideration of the Catering Committee.

Prize List and Regulations.—The SECRETARY stated that the Shows Committee had met on 1st November, and had revised the Premium List and Regulations for the Dumfries Show.

It was proposed that, as usual, their report be printed and issued for consideration in detail at next meeting of the Board.

The Board approved of this course.

Special Prizes.—The following special prizes were accepted, and votes of thanks accorded to the donors:—

- (1) Aberdeen-Angus Cattle Society—Champion Gold Medal, value £10, for the best animal in the breeding classes—breeding animals shown as "Extra Stock" being eligible to compete.
- (2) Galloway Cattle Society—Dr Gillespie Memorial Challenge Trophy, on the same conditions as at Stirling.
- (3) The Clydesdale Horse Society—Cawdor Challenge Cup for the best Clydesdale Mare or Filly, on the usual conditions.
- (4) Board of Agriculture for Scotland—£40 towards the prizes in the Highland Pony Classes, and £12 towards prizes for Goats.
- (5) Cheviot Sheep Society—Perpetual Challenge Cup, value £25, gifted by Mr J. Borthwick, for best sheep in the Cheviot Classes.
- (6) Oxford Down Sheep-Breeders' Association—"Roberton" Challenge Cup and £21 towards classes.
- (7) Mr Dugald M'Kechnie, Glasgow—Special Prizes of £7, 7s. and £3, 3s. for group of Suffolk Sheep comprising Ram, Ram Lamb, Shearling Ewe, and Ewe Lamb, all to be registered or eligible for registration in Flock-Book and bred in Scotland by exhibitor, with the exception of the Ram.
- (8) Large Black Pig Society—£24 towards the prizes in the Large Black Pig Classes.

Proposed Tractor Demonstration.

Mr P. O. TURNBULL, Convener of the Implements Committee, submitted the following motion, which appeared under his name on the Agenda:—

"That it be remitted to the Implements Committee to consider and report as to the desirability of holding a demonstration of Farm Tractors and Tractor Implements, or either, during the year 1922."

Mr WILLIAM POOLE asked if the remit was sufficiently wide to include motor tillage implements for market gardens and fruit gardens, and on receiving this assurance, he seconded the motion, which was unanimously agreed to.

Education.

National Diploma in Dairying.—Reports on the Examinations for the National Diploma in Dairying, held at Reading and Kilmarnock in the end of September, were laid on the table.

Conference with British Dairy Farmers' Association.—Mr CHARLES DOUGLAS reported that he had attended a conference in London recently, called by the British Dairy Farmers' Association, regarding the conditions of award of Dairy Diplomas. It was decided at that conference that various Societies, including this Society, should be invited to nominate members of a Committee to investigate the conditions, particularly those regarding Practical Work, on which Dairy Diplomas were awarded.

On the motion of the CHAIRMAN, Mr Douglas was unanimously appointed to represent the Society on that Committee.

Portrait of the late Lord Polwarth.

A letter was submitted from the Dowager Lady Polwarth offering to the Society a framed engraving of the late Lord Polwarth, to be hung in the Directors' meeting room.

It was agreed that the offer be accepted with thanks.

Date of next Board Meeting.

On the motion of Mr A. B. LEITCH, seconded by Mr ALEXANDER ROBERTSON, it was unanimously agreed to hold the next meeting of Directors on Wednesday 30th November, instead of Wednesday 7th December.

MEETING OF DIRECTORS, 30TH NOVEMBER 1921.

Sir HUGH SHAW STEWART, C.B., of Greenock and Blackhall, Bart., in the Chair.

Present.—*President*—Earl of Stair, D.S.O., Lochinch. *Vice-President*—Sir Herbert E. Maxwell, D.C.L., LL.D., F.R.S., of Monreith, Bart. *Ordinary Directors*—Mr James Durno; Mr David Ferrie; Mr W. P. Gilmour; Mr James Grieve; Lieut.-Col. W. T. R. Houldsworth; Mr J. Ernest Kerr; Mr Thomas Kirk; Mr Andrew B. Leitch; Mr James R. Lumsden; Captain Robert Macmillan; Mr James M'Queen; Mr H. B. Marshall; Mr William Meiklem; Colonel John L. Reid; Mr John P. Sleigh; Mr R. A. Smith; Major Mark Sprot; Sir Hugh Shaw Stewart, Bart., C.B.; Mr Phipps O. Turnbull; Mr George Will. *Extraordinary Directors*—Mr Alexander Cowan; Colonel F. J. Carruthers; Major C. R. Dudgeon; Mr John Elliot; Mr F. N. M. Gourlay; Mr Robert Park; Mr R. Jardine Paterson; Mr James Phillips; Mr C. W. Ralston; Mr G. Bertram Shields. *Hon. Secretaries*—Charles Douglas, D.Sc., C.B. *Hon. Treasurer*—Sir David Wilson, Bart. *Consulting Engineer*—Professor R. Stanfield. *Consulting Chemist*—Dr J. F. Tocher.

The late Robert D. Thom of Pitlochrie.

Before proceeding with the business of the Meeting, the CHAIRMAN made sympathetic reference to the death of Mr Robert D. Thom of Pitlochrie, who, until recently, was a Director of the Society. He said that Mr Thom was thoroughly conversant with all matters connected with practical Agriculture, and took a keen interest not only in the affairs of his native county, but in all the business of this Society. He was much esteemed for his high character, and his kindly disposition endeared him to all who came in contact with him. A resolution of regret and sympathy was submitted and approved, the members present upstanding, and the Secretary was instructed to forward a copy thereof to the widow of the deceased.

Letters.

Letters were read from the Dowager Lady Balfour of Burleigh, Sir Thomas Cross, and Mr Andrew Spence, thanking the Directors for resolutions of sympathy passed at last Meeting.

Vacancy on the Board.

On behalf of the Ordinary Directors in the Aberdeen Division, Mr JAMES DURNO, Upper Mill, moved, and Colonel J. L. REID of Cromley Bank seconded, that Mr William Low of Balmakewan, Marykirk, Montrose, be nominated as an Ordinary Director to fill the vacancy caused through the death of the late Major D. A. Spence. This was unanimously agreed to.

Stirling Show, 1921.

A letter was submitted from the Town Clerk of Stirling with regard to the state of the King's Park, and pointing out that over considerable portions of the park water was lying at places where this did not occur before. On the recommendation of the Shows Committee, it was agreed to remit to Mr James M'Laren, Cornton, and Mr Alexander Robertson, Polmaise, to consider as to what action should be taken, to discuss the matter with the Town Council of Stirling, and to report.

Dumfries Show, 1922.

Prize List.—A Report of the Shows Committee of 1st November, which had been printed and circulated, was submitted.

Mr JAMES DURNO moved that the following clause in the Minute relating to Short-horn Cattle be deleted—

“On the motion of Mr James Durno, seconded by Colonel J. L. Reid, it was agreed to alter the classification so that the ages be reckoned from the 1st December instead of the 1st January, in each class.”

This was agreed to.

Mr DURNO then moved that the classes for Shorthorns remain as at present, with the exception that Class 3 read as follows: “Bull calved on or after 1st January, and not later than 31st March 1921.”

Colonel J. L. REID seconded the motion, which was unanimously agreed to.

One Hundredth Anniversary of first Show.—The CHAIRMAN said that the Committee had considered the question of marking the occasion of the one hundredth anniversary of the first Show of the Society, but they wished to postpone any report until some alternative proposals had been discussed.

Red Poll Cattle.—The SECRETARY reported that the Committee had not yet received certain information which they wished to enable them to arrive at a decision as to the proposal to provide classes. They expected to be in a position to report at next Meeting of the Board.

On the motion of Colonel F. J. CARRUTHERS, Convener of the Shows Committee, the Report, as amended, was then approved.

Shows Committee Minute.—A Minute of Meeting of Shows Committee, dated 30th November, was submitted and approved.

The Minute recommended:—

(a) **Late Evening.**—That the Show be open till 9 o'clock on the Thursday evening.

(b) **Middle White and Cumberland Pigs.**—That the classes for Middle White and Cumberland Pigs remain as last year, subject to the proviso, in the case of the latter, that the Breed Society contribute towards the prize fund.

(c) **Additional Class for Ayrshire Heifers.**—That a Petition from breeders of Ayrshire Cattle in the Southern Counties of Scotland and Border District, requesting that an additional class be provided for Ayrshire Heifers in calf, not exceeding three years of age, and due to calve before 1st December of the year of the Show, be granted.

Convener of Local Committee.—On the motion of Colonel F. J. CARRUTHERS, seconded by Captain ROBERT MACMILLAN, Colonel R. F. Dudgeon, C.B., of Cargen, Dumfries, was unanimously appointed Convener of the Local Committee of Management.

Appointment of Judges.—The SECRETARY reported that, at a Meeting of the Board in Committee on 29th November, Judges had been appointed for the various classes of Stock. These had been communicated with, and after replies were received the list of Judges would be published in the Press.

Forage Committee.—On the motion of Mr GEORGE WILL, Mr J. G. M'Myn was added to the membership of the Forage Committee.

Special Prizes.—The following Special Prizes were accepted, and votes of thanks accorded to the donors:—

(1) **Contributed**—£22 in prizes of £10, £6, £4, and £2, for Shorthorn Bulls calved on or after 1st April 1921.

(2) **British Friesian Cattle Society**—£53 towards the prizes in the British Friesian Classes, together with two Champion prizes of £5 each for the best Female and for the best Male exhibited.

(3) **The Hunters' Improvement, &c., Society**—Champion Gold Medal for the best Hunter Filly, not exceeding 3 years old, registered with a number in the Hunter Stud-Book.

(4) **The Shetland Pony Stud-Book Society**—Silver Medal for the best Shetland Pony, on the same conditions as formerly.

(5) **“Four Lovers of the Breed” (Shetland Ponies)**, per Mr W. Mungall of Transy—£10 in prizes of £5, £3, and £2 for Shetland Pony Foals, on same conditions as formerly.

(6) **The Society of Border Leicester Sheep Breeders**—Two Gold Medals for best Male and best Female of the breed exhibited in the ordinary classes—animals entered as “Extra Stock” not eligible.

(7) **Suffolk Sheep Society**—£25 in prizes as follows: Suffolk Ram Lambs, £10; three Suffolk Ewe Lambs, £8, £5, and £2, as at Stirling.

- (8) *National Pig-Breeders' Association*—(a) Gold Medal, value £5, for the best large White Boar, and Gold Medal, value £5, for the best large White Sow; (b) Gold Medal, value £5, for the best middle White Boar, and Gold Medal, value £5, for the best middle White Sow.
- (9) *British Berkshire Society*—Champion prize of £10 for best animal in Berkshire Classes. Animals must be entered in, or eligible for entry in, the British Berkshire Society's Herd-Book, having the date of farrow and breeder's name, the names and numbers of the sire and dam entered in catalogue, and the Judge to be selected from the Breed Society's list of Nominations.

Blue-Grey Cattle.—Mr R. JARDINE PATERSON of Balgray brought forward a proposal that classes be provided for Blue-Grey Cattle.

On the motion of Colonel F. J. CARRUTHERS, it was agreed that the proposal be remitted to the Shows Committee for consideration and report.

Proposed Tractor Demonstration.

A Minute of Meeting of Implements Committee, dated 29th November, was submitted and approved.

The Minute recommended that a Demonstration of Farm Tractors and Tractor Implements be held in the autumn of 1922, provided suitable ground can be obtained; and that it be remitted to the following Sub-Committee to consider details, draw up a scheme, look out for suitable ground, and report: Mr P. O. Turnbull, *Convener*; Mr Thomas Kirk; Mr A. B. Leitch; Mr William Poole; Mr G. B. Shields; Mr John Speir; Mr George Will; and the Consulting Engineer.

Grants to Local Societies.

A Report by the Shows Committee, dated 30th November, relating to Grants to Local Societies, was submitted and approved.

The Committee recommended twenty-two districts for grants of £12 each; eight districts for three Silver Medals each; thirteen districts for grants of £15 each for Stallions; special grants of £40 for Highland Home Industries; £20 for Women's Rural Institutes; £20 to Kilmarnock Cheese Show; £5 to Shetland Agricultural Society; £3 each to North Uist, Rousay (Orkney), South Ronaldshay, and Burray (Orkney); a Gold Medal and a Silver Medal to the British Dairymaids' Association; sixteen districts for two Medals each; the usual Medals at Ploughing and Hoeing Competitions; and five districts for two Medals each for Cottages and Gardens; Long Service Medals and Certificates, say £112—making the total sum offered in 1922 £802, against £782 awarded in 1921.

Finance.

A Minute of Meeting of Finance Committee, dated 30th November, was submitted and approved.

The Minute dealt with the following matters:—

"Grass Sickness" Investigation.—Dr Tocher's accounts of expenses in connection with the Investigation into "Grass Sickness" in Horses for the period from 1st May to 31st July 1921, amounting to £375, 9s. 9d., and for the period 1st August to 31st October 1921, amounting to £244, 1s. 5d., had been submitted. The Committee were satisfied that these accounts were in order, and recommended their approval for transmission to the Board of Agriculture for Scotland. Accompanying the accounts was a report on the progress of the work during the same period.

Charges for Space, &c., at the Show.—The Committee had carefully considered the remit from the Board as to the possibility of making any reductions in the charges for entries of Implements, Stock, &c., at the Show, and recommended as follows: (a) That no reduction be made next year in the charges for space for Implements and Machinery; (b) that with regard to entries of Stock, a reduction of approximately 10 per cent be made in each class, the actual reductions to be adjusted later; (c) that the charges for admission of the public be as follows: Tuesday, 7s. 6d.; Wednesday, 5s.; Thursday, 2s. 6d.—after 5 o'clock, 1s.; Friday, 1s.

Second Clerk.—It was intimated that Mr A. S. Cavers, Second Clerk to the Society, had been appointed Secretary of the Yorkshire Agricultural Society. He wished to be free to commence his duties at York on 2nd January 1922, and it was recommended that this be agreed to.

Consulting Engineer.—The Committee recommended that Professor Stanfield's salary as Consulting Engineer be increased from £125 to £150 per annum.

Typist.—It was recommended that Miss Maitland's salary as Typist be increased from £130 to £140 per annum.

West of Scotland Agricultural College.

A letter was read from the Secretary of the West of Scotland Agricultural College, pointing out that, according to the revised Constitution of the College, there was, in future, to be only one representative of the Society on the Governing Board of the College.

On the motion of Sir DAVID WILSON, Sir Hugh Shaw Stewart, Bart., was unanimously elected as the Society's representative.

MEETING OF DIRECTORS, 4TH JANUARY 1922.

Sir HUGH SHAW STEWART, C.B., of Greenock and Blackhall, Bart., in the Chair.

Present.—President—Earl of Stair, D.S.O., Lochninch. *Ordinary Directors*—Mr Thomas A. Buttar; Mr David Ferrie; Mr W. P. Gilmour; Mr James Grieve; Lieut.-Col. W. T. R. Houldsworth; Mr J. Ernest Kerr; Mr Thomas Kirk; Mr Andrew B. Leitch; Mr James R. Lumsden; Mr James M'Laren; Mr J. T. M'Laren; Mr H. B. Marshall; Mr Alexander Robertson; Mr John P. Sleigh; Mr John Speir; Major Mark Sprot; Sir Hugh Shaw Stewart, Bart., C.B.; Mr Phipps O. Turnbull; Mr George Will. *Extraordinary Directors*—Mr Alexander Cowan; Colonel F. J. Carruthers; Mr John Elliot; Mr F. N. M. Gourlay; Mr John M'Caig; Mr Hugh Martin; Mr A. M. Montgomery; Mr Robert Park; Mr R. Jardine Paterson; Mr James Phillips; Mr William Poole; Mr C. W. Ralston; Mr G. Bertram Shields. *Hon. Secretary*—Mr Charles Douglas, D.Sc., C.B. *Hon. Treasurer*—Sir David Wilson, Bart. *Auditor*—Mr W. Home Cook. *Consulting Engineer*—Professor R. Stanfield. *Consulting Chemist*—Dr J. F. Tocher.

Dumfries and Galloway Club and Southern Club, Dumfries.

Letters were submitted from the Dumfries and Galloway Club and the Southern Club, Dumfries, offering to admit as Honorary Members of these Clubs any of the Directors and officials of the Society who may be in Dumfries in connection with the Show. It was agreed to thank the Clubs for this generous offer of hospitality, which the Directors had much pleasure in accepting.

Finance.

A Minute of Meeting of Committee, dated 4th January, was read and approved.

The Minute stated (1) that an Abstract of the Accounts for the year 1920-21, as prepared by the Society's Auditor, had been submitted and approved, and signed by two members of the Finance Committee and by the Auditor; and (2) that the usual estimate of probable Income and Expenditure for the year 1921-22, as prepared by the Secretary, had been submitted.

Stirling Show, 1921.

Mr JAMES M'LAREN, Cornton, reported that, as instructed at last Meeting, he had, along with Mr Alexander Robertson, discussed with the Town Council of Stirling the question of what steps, if any, should be taken by the Society in connection with the restoration of the ground on which the Show was held at the King's Park. After full consideration, they had agreed to recommend that the work of restoration should be undertaken by the Town Council of Stirling, and that the Society should pay to the Council the actual cost thereof, including seeds, &c., up to a maximum of £110. He moved accordingly.

The motion was seconded by Mr ALEXANDER ROBERTSON, and agreed to.

Dumfries Show, 1922.

Stewards.—The Stewards of the various departments were appointed as follows: *Cattle*—Mr J. Ernest Kerr and Mr Moffat S. Thomson; *Horses*—Mr John M'Caig and Mr John P. Sleigh; *Sheep, Goats, Pigs, and Wool*—Captain R. Macmillan and Mr John Elliot; *Grand Stands*—Lieut.-Colonel John L. Reid and Captain Thomas Kirk; *Forage*—Mr Hugh Martin and Mr Robert Park; *Gates*—Mr Alexander Forbes

and Mr James M'Queen; *Implements*—Mr P. O. Turnbull and Mr John Speir; *Poultry*—Mr James R. Lumsden; *Catering, Bee Appliances and Honey, &c.*—Mr David Ferrie.

Veterinary Surgeon.—On the motion of Mr W. P. GILMOUR, Balmangan, seconded by Lieut.-Colonel F. J. CARRUTHERS of Dormont, Mr James Lindsay, M.R.C.V.S., Dumfries, was unanimously appointed Veterinary Inspector for the Dumfries Show, on the usual conditions.

Special Prizes.—The following Special Prizes were accepted, and votes of thanks accorded to the donors:—

- (1) *Ayrshire Cattle Herd-Book Society*—£20 to provide two prizes of £10 each for the best Male and Female respectively of the Ayrshire Breed, entered with a number in the Herd-Book not later than 1st June 1922.
- (2) *Hackney Horse Society*—Champion Prize of £10 for the best Hackney Mare or Filly, on the same conditions as formerly.
- (3) *The National Pony Society*—Special Prize of £10 for the best Highland Stallion, Mare, Colt, or Filly, entered or accepted for entry in the Highland Section of the National Pony Stud-Book, "Extra Stock" being eligible to compete; and Special Prize of £10 for the best Western Island Stallion, Mare, Colt, or Filly, entered or accepted for entry in the Highland Section of the National Pony Stud-Book, "Extra Stock" being eligible to compete.
- (4) *Gloucestershire Old Spots Pig Society*—£15 towards the prizes in the Gloucestershire Old Spots Classes.

Additional Classes, &c.—A Minute of Meeting of Shows Committee, dated 4th January, was submitted and approved.

The Minute dealt with the following matters:—

Red Poll Cattle.—The Committee had considered an application from the Red Poll Cattle Society, and recommended that three classes be provided as follows: Yearling Bull, Yearling Heifer, and Cow or Heifer, in milk or in calf, born in or before 1920, with prize-money at the rate of £10, £5, and £3 for each class—the breed Society to contribute half of the prize-money.

Blue-Grey Cattle.—An application had been considered from the Galloway Cattle Society for the provision of two classes for Blue Grey Steers as follows: (1) Calved on or after 1st January 1920—£10, £5, £3; (2) Calved on or after 1st January 1921—£10, £5, £3, the above-mentioned Society to provide the prize-money. It was recommended that the offer be accepted and the classes provided.

Dun and Belted Galloways.—An application had been considered from the Dun and Belted Galloway Cattle-Breeders' Association for the provision of four classes for Belted Galloways, with a total prize-money of £56, and four classes for Dun Galloways, with a total prize-money of £56—the Association to provide half the total prize-money. The Committee recommended that four classes for Belted Galloways only be provided, as follows: (1) Bull calved before 1st December 1920—£8, £4, £2; (2) Bull calved on or after 1st December 1920—£8, £4, £2; (3) Cow three years old and upwards in milk—£8, £4, £2; (4) Heifer calved on or after 1st December 1919—£8, £4, £2.

Rural Industries Section.—On a Report of a Sub-Committee, it was recommended that a Rural Industries Section be instituted, embracing fifteen classes, with prize-money of £8, £2, and £1 in each class.

One Hundredth Anniversary of Show.—The Committee had had under consideration the steps to be taken to mark the one hundredth anniversary of the Society's first Show. A proposal that Gold Medals be struck to commemorate the event, and awarded to each section of live stock, had been negatived by a majority. It was recommended that it be remitted to the following Sub-Committee to consider the question of the erection of a suitable building as a Rest Room for Ladies, either for the use of members or for both members and non-members: Sir Hugh Shaw-Stewart, Bart., Colonel F. J. Carruthers, Mr Charles Douglas, D.Sc., C.B., Mr David Ferrie, Mr Thomas Kirk, Mr John Speir, and Sir David Wilson, Bart.

Entry Fees for Implements.

A letter was submitted from the Agricultural Engineers' Association, London, referring to the present cost of exhibiting at Agricultural Shows, and asking for a substantial reduction in the present Show charges.

Mr P. O. TURNBULL, Convener of the Implements Committee, referred to the decision arrived at at last Meeting, that no reduction be made in these charges, and moved suspension of the Standing Orders in order that the matter might be reconsidered.

Mr WILLIAM POOLE seconded, and on a vote being taken, the necessary two-thirds majority was obtained, and the Standing Orders were accordingly suspended.

Mr TURNBULL then moved that the letter from the Agricultural Engineers' Association be remitted to the Finance Committee for consideration and report, and that the Committee, at the same time, reconsider their former decision in relation to the application of the Scottish Agricultural Implement Dealers' Association, that no reduction be made in the charges for Implement stands at the Show.

Mr WILLIAM POOLE seconded, and the motion was agreed to.

Education.

Agricultural Education Association.—A letter was submitted from Mr T. B. Turner, Secretary of the National Agricultural Examination Board, transmitting copy of a letter which had been sent by the Board to the Agricultural Education Association. In that letter it was stated that the Board had considered the proposal put forward by the Association that a larger body than that governing the National Diploma should be brought into existence to supervise all Agricultural Diploma Examinations, and that the Board should take the initiative in obtaining information as to the possibility of their combining with others for the purpose of giving, consequent on examination, a uniform qualification embracing all existing Agricultural Diplomas. The Board pointed out that they had been authorised by the two constituent Societies to appoint teachers as Examiners for the National Diploma in Agriculture; but they did not think the time opportune to take action with regard to the larger questions raised by the Association. They would, however, be glad to receive, for future consideration, any definite suggestions the Association might wish to make concerning the present Syllabus of the N.D.A.

On the motion of Mr CHARLES DOUGLAS, Convener of the Education Committee, the action of the National Agricultural Examination Board was approved.

Scottish Centre for N.D.A. Examination.—A letter, dated 30th December 1921, from the Students' Council of the West of Scotland Agricultural College, proposing that there should be a Scottish Centre for Examination for the National Diploma in Agriculture, as there is in the case of the N.D.D. Examination, so as to avoid the cost to Scottish Students of attending the Examination at Leeds, was remitted to the National Agricultural Examination Board for consideration and report.

Show of 1924.

A letter was submitted from the Lord Provost of Perth, referring to the letter from the Town Clerk of 16th September 1920, conveying an invitation to the Society to hold their 1924 Show at Perth. The Lord Provost expressed the hope that this invitation would be favourably considered by the Society, and assured the Directors that he would do everything in his power to see that all facilities available were placed at the disposal of the Society. He also stated that the question of a grant from the Corporation Funds would be placed before the Town Council at an early date, and he was confident that the grant proposed would be a liberal one.

Mr DAVID FERRIE of Parbroath moved: "That provided a suitable site is available, and satisfactory financial and other arrangements can be made, the Society's Show of 1924 be held in the Perth District."

The motion was seconded by Mr T. A. BUTTAR, Corston, and unanimously agreed to.

New Members.

The SECRETARY intimated that there were 693 candidates for election as members of the Society at the Anniversary General Meeting to be held that afternoon.

Finance.

The remaining part of the Minute of Meeting of 4th January was submitted and approved.

The Minute recommended that Mr R. C. Todd, at present temporary Clerk with the Society, be appointed Second Clerk, at a salary of £250 per annum. It was further recommended that a Junior Clerk be appointed at a commencing salary of £75 per annum.

MEETING OF DIRECTORS, 1st FEBRUARY 1922.

Sir HUGH SHAW STEWART, C.B., of Greenock and Blackhall, Bart., in the Chair.

Present.—*Vice-President*—Colonel R. F. Dudgeon, C.B., of Cargen. *Ordinary Directors*—Mr Thomas A. Buttar; Mr David Ferrie; Mr W. P. Gilmour; Mr James Grieve; Lieut.-Col. W. T. R. Houldsworth; Mr J. Ernest Kerr; Mr Thomas Kirk; Mr Andrew B. Leitch; Mr James R. Lumsden; Sir Kenneth Mackenzie, Bart.; Mr James M'Laren; Captain Robert Macmillan; Mr James M'Queen; Mr H. B. Marshall; Mr William Meiklem; Mr Alexander Robertson; Mr R. A. Smith; Major Mark Sprot; Sir Hugh Shaw Stewart, Bart., C.B.; Mr Phipps O. Turnbull. *Extraordinary Directors*—Mr Alexander Cowan; Colonel F. J. Carruthers; Major C. R. Dudgeon; Mr John Elliot; Mr Alexander Forbes; Mr F. N. M. Gourlay; Mr A. M. Montgomery; Mr Robert Park; Mr James Phillips; Mr William Poole; Mr G. Bertram Shields; Mr Moffat S. Thomson. *Hon. Secretary*—Mr Charles Douglas, D.Sc., C.B. *Hon. Treasurer*—Sir David Wilson, Bart. *Consulting Engineer*—Professor R. Stanfield. *Consulting Chemist*—Dr J. F. Tocher.

Science.

A Minute of Meeting of Committee, dated 1st February, was submitted and approved.

The Minute dealt with the following matters :—

Schedule of Unit Values.—The Schedule of Unit Prices of Manures and Feeding-Stuffs for the current year had been revised, and it was recommended that it be printed and issued as usual.

Values of Unexhausted Manures and Feeding-Stuffs.—It was recommended that the Table of Values of Unexhausted Manures and Feeding-Stuffs be reissued, and that it be remitted to Dr Tocher, Consulting Chemist, to revise it in terms of the new Unit Values.

Potash Fertilisers.—Dr Tocher had drawn attention to the Leaflet No. 335 of the Ministry of Agriculture and Fisheries, which contained a list of Potash Fertilisers of various grades. A minimum and a maximum percentage of potash was given, and not the exact percentage specified as necessary in Invoices under the Fertilisers and Feeding-Stuffs Act. He found frequently that farmers expected their deliveries to approximate to the higher figure given, and had difficulty in understanding why a difference should exist between the amount of fertilising constituent as stated in official leaflets and trade circulars, and as stated in invoice guarantees. It was desirable, for the sake of clearness, and to prevent misunderstanding or misrepresentation, that the minimum proportions to be stated in an invoice should also be stated in an official leaflet; and it was recommended that it be remitted to Dr Tocher to bring the matter to the notice of the Ministry of Agriculture and Fisheries.

Dumfries Show, 1922.

Showyard, Prize List, &c.—Minutes of Meetings of Shows Committee, dated 4th January (second part) and 31st January, were submitted and approved.

The Minutes dealt, *inter alia*, with the following matters :—

Horse-Shoeing Competition.—It was recommended that a Horse-Shoeing Competition be held on the Thursday and Friday, on the same lines as at Paisley in 1913. Two classes would be provided—one open and the other confined to apprentices or juniors under twenty-one years of age. The competitions to be for shoeing farm horses only.

Reserves for Championships.—It was agreed to recommend that animals placed Reserve to the winners of Championships be given a suitable card and rosette to indicate this fact.

Hundredth Anniversary of First Show.—On the Report of the Sub-Committee appointed at last Meeting, it was agreed to recommend that, in order to mark the Hundredth Anniversary of the First Show, a room for lady members be erected with a permanent frontage 40 feet wide. The permanent frontage would provide the desired memorial, and would have a small brass plate affixed indicating the occasion of its erection. This room would be available for lady members; but it was further recommended that this year each member of the Society should be entitled, on written application, to obtain one ticket, admitting to this room, for a lady friend.

Rural Industries Section.—A letter had been considered from the South-Western Area Committee of the Scottish Women's Rural Institutes suggesting that six

additional classes, confined to Institutes in the South-Western Area, be provided, and offering to provide the prize-money, amounting to £36. It was recommended that the offer be accepted and the additional classes provided.

Red Poll Cattle.—On a representation from the Red Poll Cattle Society, it was recommended that the class for yearling bulls be altered so as to admit bulls of any age.

Belted Galloways.—It was recommended that, in the classes for Belted Galloways, the class for Cow or Heifer, three years old and upwards, in milk, be altered to read "in milk or in calf, and if in calf, to calve on or before 1st December."

Show Contracts.—It was agreed to recommend that it be remitted to the following Sub-Committee, with powers, to arrange the contract for timber and other contracts in connection with the Showyard: Colonel F. J. Carruthers, *Convener*, Sir Hugh Shaw Stewart, Bart., Colonel R. F. Dudgeon, Mr David Ferrie, Mr James M'Laren, Mr W. P. Gilmour, Mr J. G. M'Myn, Mr George Will, and Professor Stanfield.

Blackface Sheep.—The Committee had considered a letter from Dr F. A. E. Crew, of the Animal Breeding Research Department, University of Edinburgh, in which he suggested that a class be provided for rough Ewes and Lambs, off the hill and not hand-fed or kept enclosed on low ground, the judges to be two in number, one a breeder of Blackface sheep, and the other an authority on wool. Dr Crew undertook to raise the prize money. It was recommended that this suggestion be remitted to the following Sub-Committee for consideration and report: Mr John Elliot, *Convener*, Mr Alexander Cowan, Mr Thomas Kirk, Mr James M'Laren, Mr Robert M'Millan, Mr James R. Lumsden, and Mr David Ferrie. (The Sub-Committee's report follows.)

The Sub-Committee mentioned above, having met subsequent to the Meeting of Shows Committee and having prepared a report, received permission to report direct to the Board. The Sub-Committee's recommendations were as follows: (1) That the Society provide a class for the Blackface Tup carrying the fleece best adapted for protection combined with suitability for manufacturing purposes; (2) that the class for Ewes and Lambs suggested by Dr Crew be provided, and that his offer to raise the prize money be accepted, the prizes to be £10, £5, and £2; (3) that the judges be the judge of Wool, together with two of the Blackface judges—viz., Mr Walter Burton and Captain Willison.

The Report was approved.

Forage.—A Minute of Meeting of Forage Committee, dated 1st February, was submitted and approved.

Special Prizes.—The following Special Prizes were accepted, and votes of thanks accorded to the donors:—

- (1) The President—Champion Medals for each section of Live Stock.
- (2) Shorthorn Society—Two Champion Prizes of £20 each, with Silver Medals to the breeders, for best Male and best Female Shorthorns.
- (3) Mrs Brown of Knockbren—The Knockbren Challenge Cup, value £50, for the best Belted Galloway.
- (4) Major Alexander Browne of Callaly Castle—£10 in prizes of £5, £3, and £2, for Blackface Ram Lambs bred by Exhibitor.
- (5) Large Black Pig Society—Champion Cup, value £10, 10s., for best Large Black Boar or Sow.
- (6) Messrs Neilson & Cleland, Ltd.—Two Special Prizes, value £5 each, in the form of pieces of plate, to be awarded to the winners of the first prizes in the Horse-Shoeing Competition.

Proposed Tractor Demonstration.

A Minute of Meeting of Implements Committee, dated 31st January, embodying Minutes of Meetings of Sub-Committee, dated 3rd and 31st January, was submitted and approved.

The Minute recommended,—

- (1) That the date of the Demonstration be provisionally fixed for the 17th, 18th, 19th, and 20th October 1922.
- (2) That the classification of entries be on the following lines:—
 - (a) Tractors. These not to exceed 40 cwt. in weight.
 - (b) Implements—including Ploughs, Sub-Soiling Implements, Cultivators, Harrows, and Cultivating Implements generally—special attention being directed to combinations of implements—e.g., cultivators and harrows—calculated to minimise the number of operations necessary to prepare the land for seed.
 - (c) Implements suitable for Smallholders, Fruit Growers, and Market Gardeners.

- (3) That the Tractors be demonstrated ploughing both lea and stubble, and also pulling such implements as cultivators and harrows. That there be no dynamometer tests, no haulage tests, no threshing tests, and no oil-consumption tests.
- (4) That it be remitted to the Sub-Committee appointed on 30th November 1921, as a Special Committee, to decide upon the site of the demonstration, to carry out all necessary arrangements, and to report direct to the Board of Directors from time to time.

Finance.

A Minute of Meeting of Committee, dated 1st February, was submitted and approved.

The Minute stated that, in accordance with the remit from the Board at last meeting, the Committee had reconsidered the question of the charges for Implement Stands at the Show, and had agreed to recommend an average reduction of 12½ per cent, this reduction to be applied to the various sections of shedding in accordance with a scale prepared by the Consulting Engineer and Secretary.

MEETING OF DIRECTORS, 1st MARCH 1922.

Mr CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, in the Chair.

Present.—*Vice-President*—W. J. H. Maxwell of Munches. *Ordinary Directors*—Mr Thomas A. Buttar; Mr David Ferrie; Mr W. P. Gilmour; Mr James Grieve; Lieut.-Colonel W. T. R. Houldsworth; Mr Thomas Kirk; Mr Andrew B. Leitch; Mr James R. Lumsden; Sir Kenneth M'Kenzie, Bart.; Mr James M'Laren; Captain Robert M'Millan; Mr James M'Queen; Mr John Speir; Major Mark Sprot; Mr Phipps O. Turnbull. *Extraordinary Directors*—Colonel F. J. Carruthers; Mr Alexander Cowan; Major C. R. Dudgeon; Mr John Elliot; Mr John M'Caig; Mr Hugh Martin; Mr James Phillips; Mr G. Bertram Shields. *Hon. Secretary*—Mr Charles Douglas, D.Sc., C.B. *Consulting Engineer*—Professor R. Stanfield. *Consulting Chemist*—Dr J. F. Tocher.

Chairman.

The SECRETARY intimated that the Chairman of Directors, Sir Hugh Shaw Stewart, Bart., had been summoned by telegram to attend a Conference in London with the War Minister regarding impending changes in the Territorial Army, and had written expressing deep regret at his unavoidable absence from the meeting.

On the motion of Mr FERRIE, Mr Charles Douglas, D.Sc., C.B., of Auchlochan, was called to the Chair.

Animal Diseases Research Association.

A letter was submitted from the Secretary of the Animal Diseases Research Association, expressing the thanks of the Association for the privilege of holding meetings in the Society's Chambers, and requesting that this privilege be continued. It was agreed that the request of the Association be granted.

Vacancy on Board.

A letter was submitted, dated 9th February, from the Marquis of Linlithgow, tendering his resignation as an Ordinary Director, in consequence of his being about to leave Scotland for an uncertain period. The resignation was accepted, the Chairman expressing the deep regret of the Board that his Lordship should have found it necessary to take this step.

It was remitted to the three Ordinary Directors for the Edinburgh Show Division to bring forward a nomination of a Director to fill the vacancy.

Dumfries Show, 1922.

Proof of Prize List.—A proof print of the Prize List and Regulations was submitted, and after some emendations had been made as hereafter stated, was finally approved for publication.

Contract for Timber.—A Minute of Meeting of Special Show Contract Committee, dated 1st March, was submitted and approved.

The Minute recommended the acceptance of an offer by the Board of Agriculture for Scotland to supply the necessary timber for the Showyard at a price of approximately £5000.

Hotel Accommodation and Catering.—Minutes of Meetings of Catering Committee, dated 1st February and 1st March, were submitted and approved.

The Minute of 1st February stated that accommodation for Directors had been secured in the Station Hotel and the King's Arms Hotel, Dumfries, and for Judges, in the Crown and Mitre Hotel, Carlisle.

The Minute of 1st March recommended that the four licensed catering stands in the Showyard be placed in the hands of the same caterers as last year—viz., Mr John Mitchell, Royal Athenæum, Aberdeen; Messrs Thomas White (Restaurateurs), Ltd., Glasgow; Messrs Alex. Fairley & Son, Edinburgh; Messrs William and R. S. Kerr, Glasgow.

The Tea Stand would again be in the hands of Mr John Henderson, Aberdeen, and the British Women's Temperance Association would, as usual, have an unlicensed Refreshment Stand.

It was further recommended that the size of the catering stands be increased so as to provide double the seating accommodation; and a scale of maximum charges for meals was laid down.

Appointment of Judges.—The following additional Judges were appointed:—

(1) *Red Poll Cattle.*—Mr J. E. Quedsted, The Firs, Cheriton, Kent. *Reserve.*—Mr D. Abbott Green, East Donyland, Colchester.

(2) *Belted Galloways and Blue-Greys.*—Mr Samuel Clark, 17 Station Road, Dalbeattie; and Mr John Barbour, Afton Lodge, Lockerbie.

(3) *Horse-Shoeing.*—Mr James Lindsay, M.R.C.V.S., Dumfries; and Mr William Paul, Blacksmith, Baillie's Causeway, Hamilton.

Horse-Shoeing Competition.—On the suggestion of the Local Farriers' Association, it was decided that competitors in the Junior Class of the Horse-Shoeing Competition should be under twenty-five years of age, instead of under twenty-one years, as formerly agreed upon.

Ayrshire Cattle.—A letter was submitted from the Secretary of the Ayrshire Cattle Herd-Book Society, requesting that the evidence of the milk-yield of cows and the milking pedigree of bulls and younger females in the Ayrshire Classes, which exhibitors are invited to produce, be printed in the Catalogue, as well as being made available to the Judges.

Lieut.-Colonel W. T. R. HOULDSWORTH moved that the request be granted, and this was unanimously agreed to.

Goats.—On a representation from the Scottish Goat-keepers' Federation, it was agreed that the Milking Competition for Goats be for quantity and quality, as on former occasions, and not for quantity only, as agreed upon at a former meeting. The offer by the Federation to undertake the necessary expense of providing sample bottles and boxes for conveyance of the milk from the Showyard to Kilmarnock for analysis was accepted.

Bee Appliances and Honey.—The SECRETARY intimated that the South of Scotland Bee-keepers' Association had not seen their way to contribute to the prize-money for Bee Appliances and Honey. The Scottish Bee-keepers' Association, however, had offered to contribute one-fourth of the prize-money—i.e., £10, 10s. It was agreed that this offer be accepted.

Special Wool Classes.—On the motion of Mr ALEXANDER COWAN, the Standing Orders were suspended in order to reconsider the decision arrived at last meeting with regard to Class 97. This Class was as follows: "Tup carrying the fleece best adapted for protection, combined with suitability for manufacturing purposes, £10, £5, and £2."

Mr Cowan pointed out that, as a member of the Sub-Committee, he did not think that it was the intention to have a separate new class for Rams. He understood that the prizes were to be offered for animals drawn out of the ordinary Tup Classes, 94, 95, and 96, and that the prize money be £5, £3, and £2; and he moved accordingly.

Mr R. MACMILLAN seconded.

Mr JOHN ELLIOT, of Meigle, moved the previous question, but this was not seconded.

Mr Cowan's motion therefore became the finding of the meeting, the class to be a special one, as follows: "Tup entered in 94, 95, and 96, carrying the fleece best adapted for protection, combined with suitability for manufacturing purposes, £5, £3, and £2."

It was further agreed that this Special Class be judged by the Judge of Wool.

A letter was submitted from Dr F. A. E. Crew, suggesting a modification in the

conditions of the class for Ewe and Lamb, for which he had undertaken to provide the prize-money; and the conditions of this class were adjusted as follows: "Ewe and Lamb, unclipped, taken off the hill not earlier than 1st June, and not hand-fed or kept enclosed in low ground before that date—to be judged for wool and breed type, £10, £5, and £2."

Implement Charges.—A letter was submitted from the Scottish Agricultural Implement Dealers' Association, thanking the Directors for the proposed reductions in stand rents, but intimating that these reductions were regarded as inadequate in view of the present condition of business. They expressed the opinion that the pre-war rents and conditions should be reverted to. The letter further referred to the question of provision of alcoholic drinks to visitors at stands, and stated that if the Society had no power to enforce the prohibition of alcoholic drinks, then Regulation No. 103 regarding same should be rescinded.

The Directors did not see their way to take any action in the matter.

Rural Industries Section.—A Minute of Meeting of Sub-Committee, dated 28th February, was submitted and approved.

Special Prizes.—The following Special Prizes were accepted, and votes of thanks accorded to the donors.

- (1) *Ayrshire Cattle Herd-Book Society.*—The Cowhill Champion Cup, approximate value £30, for the best animal of the Ayrshire breed; presented by Major Henry Keswick, Cowhill Tower, Dumfries, to the Ayrshire Cattle Herd-Book Society, for competition annually at this Society's Shows.
- (2) *Mrs S. Macdonald, Garrochty.*—Challenge Cup, value £10, for best Female Anglo-Nubian Goat over two years old, in milk.
- (3) *The Mustad Nail Company.*—Two Gold Medals for the best made Shoes in the Horse-Shoeing Competition.

Judge of Ducks.—A letter was submitted from a member of the Society in the Dumfries District, suggesting that there be a separate Judge for Ducks at the Show. It was agreed that no action be taken.

Dun Galloways.—The Secretary reported that he had received a letter from the Secretary of the Dun and Belted Galloway Cattle-Breeders' Association, requesting that a deputation be received in regard to the present position of Dun Galloways. After consultation with the Chairman of Directors, he had written requesting that an outline of what the deputation proposed to bring forward should be sent in, and in reply thereto had received a letter from the Chairman of the Association, Mr N. H. Constable, Bute Estate Office. This letter pointed out that, while Dun Galloways were now admitted to the Galloway Herd-Book, this could not be carried into effect this year, as the entries to the Herd-Book were closed before any Dun Galloway Cattle could be admitted. He therefore again requested that separate classes for Dun Galloways be provided on the same lines as for Belted Galloways, and on the same condition that one-half of the prize-money be subscribed by the Association.

It was pointed out that it was now too late to deal with a suggestion of this nature, and it was agreed that no action be taken.

Forestry Examinations.

A Minute of Meeting of Education Committee, dated 28th February was submitted and approved.

The Minute recommended that the Examination for the Society's First and Second Class Certificates in Forestry be held on Tuesday, 28th March, and two following days. The Minute also contained a list of Examiners.

Proposed Tractor Demonstration.

A Minute of Meeting of the Special Committee on Tractor Demonstration, dated 1st March, was submitted and approved.

The Minute recommended that the site at Fordel, Dalkeith, be fixed upon, as this ground was particularly well suited for a thorough test of Tractors. It was further recommended that it be remitted to Mr P. O. Turnbull and Mr G. B. Shields to consider as to whether the date provisionally fixed—17th to 20th October—will be suitable, or if it may be desirable to hold the Demonstration a week later.

Highland Home Industries.

Sir KENNETH MACKENZIE of Gairloch, Bart., referred to the Grant of £40 offered annually by the Society to the Highland Home Industries Association, and which had not been taken advantage of since the year 1913. He moved that out of this sum a Grant of £15 be given to the Northern Arts and Crafts Society, which holds an Exhibition annually, in October, at Inverness.

The motion was seconded by Mr R. MACMILLAN, and agreed to.

Summer Time.

A letter was submitted from the Secretary of the Scottish Chamber of Agriculture, enclosing copy of a letter which he had written to the Prime Minister, asking him to receive, in conjunction with the Minister of Agriculture, the Home Secretary, and the Secretary for Scotland, a small Deputation to lay before them the views of Agriculturists in Scotland regarding the injurious effects of Summer Time on the Agricultural Industry.

On the motion of Mr JAMES PHILLIPS, seconded by Mr JAMES M'QUEEN, it was agreed to co-operate with the Scottish Chamber of Agriculture in this matter; and Mr David Ferrie and Mr James Phillips were appointed to act as representatives of the Society on the proposed Deputation.

Research in Animal Breeding.

A letter was submitted from Mr ALEXANDER M'CALLUM, on behalf of the Edinburgh University and College of Agriculture Joint Committee on Research in Animal Breeding, enclosing copy of a Memorandum setting forth the constitution and objects of the Committee, and its need for financial support. A request was made that the Directors receive a Deputation from the Committee to lay their case before the Board.

On the motion of Mr DAVID FERRIE, it was agreed to receive a Deputation at next Meeting.

Wart Disease in Potatoes.

Mr P. O. TURNBULL directed attention to the fact that there was in contemplation by the Ministry of Agriculture the issuing of an Order regarding Wart Disease in Potatoes. The Order would affect a large area in Scotland, embracing North Dumfries, Renfrew, part of Lanark, Dumbarton, Stirling, South-West Perth, Kinross, Clackmannan, West Lothian, and Mid-Lothian. The effect of the Order, if it were issued, would be to prevent the sale, in England, of potatoes grown in that area, except ware of immune varieties, and that only with a certificate by the grower to the effect that the potatoes would not be used for seed. He understood it was proposed that this Order should come into force on the 1st of June. Growers within the area referred to were now buying seed at high prices; and if they were not to be allowed to sell, steps should be taken at once to make their position clear, or to have the proposed Order modified.

After discussion, which was taken part in by Mr David Ferrie, Mr John Speir, and Mr G. B. Shields, it was agreed that a Deputation be appointed to wait on the Board of Agriculture for Scotland to ascertain the actual state of affairs, and if it appeared advisable, to support the Board in any action they propose to take. The following were appointed members of the Deputation: Mr David Ferrie, Mr P. O. Turnbull, Mr G. B. Shields, Mr T. A. Buttar, and Mr John Speir.

Payment of Directors' Travelling Expenses.

Mr A. B. LEITCH gave notice of the following Motion, which he proposed to submit at next Meeting: "That the Directors consider the advisability of the payment by the Society of first-class railway fares to Directors when attending Meetings of the Society."

Finance.

A Minute of Meeting of Finance Committee, dated 1st March, was submitted and approved.

The Minute recommended—

- (1) That Mr J. G. Yardley be appointed Junior Clerk to the Society at a commencing salary of £100 per annum.
- (2) That an application from the inhabitants of St Kilda, for Seed Oats and Seed Potatoes for the coming season, similar to what was sent in 1919, be granted.

PROCEEDINGS AT GENERAL MEETINGS.

GENERAL MEETING, 1st JUNE 1921.

JOHN J. MOUBRAY of Naemoor, Vice-President, in the Chair.

New Members

Three hundred and fifty-two candidates were balloted for and admitted Members of the Society.

Election of Office-Bearers.

The following noblemen and gentlemen were elected office-bearers of the Society for the year 1921-22:—

President—The Earl of Stair, Lochinch, Castle Kennedy Station.

Vice-Presidents—The Right Hon. Sir Herbert E. Maxwell of Monreith, Bart., D.C.L., LL.D., F.R.S., Whauphill; Colonel R. F. Dudgeon, C.B., of Cargen, Dumfries; Mr W. J. H. Maxwell of Munches, Dalbeattie; Mr Charles Brook of Kinmount, Annan.

Ordinary Directors—1918: Mr Robert MacMillan of Holm of Dalquhairn, Woodlee, Moniaive; Sir Kenneth Mackenzie of Gairloch, Bart., 10 Moray Place, Edinburgh; Mr David Ferrie of Parbroath, Cupar-Fife; Mr William Donald, Fardalehill, Kilmarnock; Mr Robert Dickinson, Longcroft, Oxton; Mr Phipps O. Turnbull, Smeaton, Dalkeith; Colonel J. L. Reid of Cromley Bank, Ellon; Mr J. Ernest Kerr of Harviestoun Castle, Dollar.

1919.—Mr R. A. Smith, Wester Lovat, Beauly; Mr William Weiklem, Begg, Kirkcaldy; Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart., Ardgowan, Greenock; Mr H. B. Marshall of Rachan, Broughton; Mr Thomas Kirk of Abbey Mains, Haddington; Mr James Durno, Upper Mill, Tarves; Mr James M'Laren, Cornton, Stirling; Mr W. P. Gilmour, Balmangan, Kirkcudbright.

1920.—Mr Thomas A. Buttar, Corston, Coupar-Angus; Mr John Speir, Newton Farm, Newton, Glasgow; Mr James Grieve, Rumbletonlaw, Greenlaw; Mr J. T. M'Laren, The Leuchold, Dalmeny House, Edinburgh; Major D. A. Spence, V.D., of Conveth Mains, Montrose; Mr James R. Lumsden of Arden, Dumbartonshire; Mr James M'Queen of Crofts, Dalbeattie; General Sir Walter Charteris Ross of Cromarty, Cromarty.

1921.—Lieut.-Col. W. T. R. Houldsworth of Kirkbride, Maybole; Major Mark Sprot of Riddell, Lilliesleaf; The Marquess of Linlithgow, Hopetoun House, South Queensferry; Mr John P. Sleigh, St John's Wells, Fyvie; Mr Alexander Robertson, Estate Office, Polmaise, Stirling; Mr George Will, Crichton Royal Institution, Dumfries; Mr Andrew B. Leitch, Inchstelly, Alves, Forres; The Duke of Atholl, K.T., Blair Castle, Blair Atholl.

Extraordinary Directors.—Mr Hugh Martin, Flowerdale, Kinrossie, Perth; Colonel F. J. Carruthers of Dormont, Lockerbie; Mr John Elliot, of Meigle, Clovenfords; Mr Robert Macdiarmid, Corries, Lochawe; Mr Robert Park, Brunstane, Portobello; Mr Moffat S. Thomson of Lambden, Spotsmans, Kelso; Mr Alexander Cowan, Valleyfield, Penicuik; Mr Alexander Forbes, Rettie, Banff; Mr William Poole, J.P., Englewood, Blackhall; Mr G. Bertram Shields, Dolphingstone, Tranent; Mr Thomas S. Macaulay, O.B.E., Provost of Dumfries; Mr R. Jardine Paterson of Balgray, Lockerbie; Mr J. Bryce Duncan of Newlands, Dumfries; Mr F. N. M. Gourlay, Milnton, Tynron, Thornhill; Mr C. W. Ralston, Dabton, Thornhill; Major C. R. Dudgeon, Cargen Holm, Dumfries; Mr A. M. Montgomery of Netherhall, Castle Douglas; Mr J. G. M'Myn, Kirkhouse, Kirkbean, Dumfries; Mr James Phillips, Carse, Kirkcudbright; Mr John M'Caig of Belmont, Stranraer.

Treasurer.—Sir David Wilson, Bart., D.Sc., of Carbeth, Kilmarnock.

Honorary Secretary.—Mr Charles Douglas, D.Sc., C.B., of Auchloch, Lesmahagow.

Stirling Show, 1921.

Mr JAMES M'LAREN, Convener of the Shows Committee, reported on the arrangements for the Show of that year, to be held at Stirling on Tuesday, 26th July, and

three following days. As in former years, the Show would take place in the King's Park, an excellent site which had been made available through the courtesy of the Town Council of Stirling, H.M. Office of Woods, and others having rights in the ground. The town had, in addition, voted a grant of £100 to the Show funds.

The total value of the prizes and cups offered reached the sum of £5055. Entries of implements and machinery, which had now closed, were extremely gratifying in respect of numbers. There were indications that the entries of stock would be on an unusually large scale. Unfortunately, at that moment, there were restrictions which prevented stock from England being sent into Scotland; but it was satisfactory to note that there was a probability of these restrictions being somewhat modified in the near future, in such manner that stock for exhibition could be sent under licence by the local authority.

It was expected that an attractive exhibit of Harness Horses would be forward, in view of the large addition to the prize fund provided through the efforts of Mr William S. Miller of Balmanno Castle; and that an unusually representative display of pigs would result from the expansion of the prize list and the addition of classes for several new breeds.

Dumfries Show, 1922.

Lieut.-Col. F. J. CARRUTHERS reported that the arrangements for the Dumfries Show, to be held on the 25th to 28th July 1922, were proceeding satisfactorily. It was interesting to note that this would be the hundredth anniversary of the first Show of the Society, which was held in 1822. The Directors had remitted to the Shows Committee to consider what steps should be taken to mark the occasion.

Inverness Show, 1923

Mr ALEXANDER FORBES, Rettie, reported that arrangements were proceeding for the Show of 1923 to be held at Inverness. Through the courtesy of the town of Inverness an excellent site would again be available in the Victoria Park, where the Show was held in 1911.

Law and Parliamentary.

Mr DAVID FERRIE, Convener, reported that the Law and Parliamentary Committee had dealt with the following matters:—

Docking of Horses Bill.—The Committee had considered the draft of the Docking of Horses Bill, 1921, and had recommended the Directors to oppose the passing of the Bill. In pursuance of this recommendation, the Directors had drawn up a circular letter on the subject to be sent to all Scottish Members of Parliament, and had also arranged with Mr James Lennox, Redhills, Crief, to represent the views of the Directors before the Scottish Members' Committee of the House of Commons. The promoters of the Bill had now decided to withdraw it.

Committee on Local Rating.—The Committee had also before them the question of giving evidence before the Committee on Local Rating. It was felt that the views of proprietors and tenants would more properly be represented by witnesses furnished by other organisations which embraced either proprietors or tenants, rather than by this Society, which embraced both classes. The matter, however, was being kept in view, and if any point emerged on which it was thought desirable that the Society should offer evidence, the necessary steps would at once be taken.

Dangerous Drugs Act, 1920.—Dr J. F. Tocher, Consulting Chemist to the Society, will submit a statement as to the action taken by the Directors with regard to the Regulations proposed to be issued under the Dangerous Drugs Act, 1920.

Science.

Sir DAVID WILSON, Bart., of Carbeth, Convener of the Science Committee, reported that the investigation into the disease known as "Grass Sickness" in horses was being continued during the current year. Arrangements had been made whereby a whole-time investigator was engaged on the work, under the direction of Dr Tocher. The expenses for the year, which were estimated at £1000, would be borne, as regards one-half, by this Society, the Perthshire Agricultural Society, Angus Agricultural Society, and Morayshire Farmers' Club, and, as regards the other half, by the Board of Agriculture for Scotland.

Agricultural Education.

(a) Results of N. D. A. Examination.

Mr CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Convener, submitted a Report on the examination held at Leeds in April last for the National Diploma in Agriculture. 186 candidates presented themselves for examination. 74 candidates were from Scotland.

As a result of the examination, 30 Diplomas were awarded, 1 with Honours.

Of the 186 candidates, 10 appeared for all the subjects, and of these 4 passed; 53 had passed certain subjects previously, and were completing the examination this year, and of these 26 obtained the Diploma. The remaining 123 candidates presented themselves for a group of three or four subjects, and of these 40 passed in the subjects for which they appeared, and were entitled to appear for the remaining subjects in 1922.

(b) *Examiners for the National Diploma in Agriculture.*

Mr Douglas said that the Directors of the Society had recently decided, on the advice of the National Agricultural Examination Board, to remove the restriction that had held good for a number of years past which prevented those engaged in teaching Agriculture from acting as Examiners for the National Diploma. This regulation, it was thought, unduly restricted the *personnel* available for examination purposes; and the Examining Board proposed, and the Directors agreed, that the restriction should be abolished. Times had changed considerably since the restriction had been imposed, but its removal did not mean any indifference on the part of the Directors or of the Examining Board to the practical nature of the study of Agriculture, and indeed the Board had shown the necessity of its practical nature by increasing the period to be spent on farms in the practice of agricultural work. The restriction had proceeded on a resolution passed fifteen years ago by the members of the Highland and Agricultural Society, and they were entitled to know what had been done in their name. He hoped they would approve of what had been done.

The removal of the restriction was approved.

Report by Chemist.

Dr J. F. TOCHER, Consulting Chemist to the Society, submitted a Report on the work done in his department during the past half-year.

The substance of Dr Tocher's Report appears on pages 230-239 of this volume.

Dangerous Drugs Act (1920) Regulations.

Dr TOCHER reported that he had appeared before the Dangerous Drugs Committee at the Home Office early last month, in order to represent the views of the Directors of the Society on the draft Regulations published by the Home Office and which the Home Secretary had power to put in force at any time. He had expressed the view that it was unnecessary to frame Regulations of any kind for Scotland. If, however, Regulations were to be framed, provision should be made to enable farmers to purchase and to keep opiates and other active drugs usually kept by them as remedies for colic and other minor ailments in horses, cattle, or sheep. The Regulations as framed were far too stringent, and would prove unworkable. He had pointed out that the provisions of the existing Pharmacy Acts were quite sufficient to protect the public, as these stipulated that the purchaser of laudanum, opium compounds generally, and other poisonous compounds, should be known to the seller. Furthermore, a register of sales of opium and other poisonous compounds was at present kept by every pharmacist, and these registers could be inspected at any time. No case was known where laudanum had been improperly used by a Scottish farmer in the past. Any abuse of dangerous drugs chiefly occurred among an abnormal small class of the population, and very occasionally among those who knew their properties and who handled them frequently. It was well known here that the number of cases of abuse of dangerous drugs in Scotland was microscopically small. The provision that veterinary surgeons should write "for animal use only," when prescribing an opiate or similar drug to cattle, was a stupid provision, and conveyed a different meaning from what the farmers had intended the phrase to convey. The Regulations as originally drafted had been somewhat modified as a result of the movement against them, but many changes were still necessary to protect agriculture, and these changes had been enumerated by him, and their adoption by the Committee pressed for with vigour. The Dangerous Drugs Act was a sort of sledge-hammer made specially for known vicious areas, where doubtless it would prove useful, but a sledge-hammer in the hands of certain people was a dangerous weapon. A number of innocent people might get hurt if the weapon was swung about at random in the search for a phantom culprit. That was going to happen if the draft Regulations were not fully amended to meet the actual conditions. He hoped that as a result of their representations, farmers would retain the right to buy in the prescribed manner, and use on the farm, the remedies they had always used and which were so frequently necessary to preserve the health of their stock.

Dr Tocher further proceeded to explain that since he had prepared the preceding remarks, the Report of the Dangerous Drugs Committee had been issued, and also the

Regulations in their final form. These Regulations were to come into force on 1st September of the current year. The third page of the report contained the list of witnesses who appeared before the Parliamentary Committee. These included representatives of the British Medical Association, the Pharmaceutical Society, Pharmaceutical Society of Ireland, Fine Chemical Manufacturers, Wholesale Druggists, Royal Veterinary College, and Animal Medicine and Allied Traders' Association. The witnesses who appeared in agricultural interests were Professor John Penberthy, on behalf of the Central Chamber of Agriculture; Mr J. Donaldson, on behalf of the National Farmers' Union; Mr H. Armour, on behalf of Scottish Chamber of Agriculture; and himself, on behalf of the Highland and Agricultural Society of Scotland. The report contains little of interest to agriculturists except the matter contained on page 9. Dr Tocher quoted from the report as follows:—

"Full evidence as to the requirements of farmers and other owners of stock was given by the witnesses who appeared before us, and we have had the advantage of consulting with the representatives of the Ministry of Agriculture. We have inquired very carefully how far the draft Regulations affect the existing use of drugs for the purposes mentioned, and whether any modifications are needed in the Regulations.

"There are two main classes of people to be considered:—

"(a) The farmer or stock-owner;

"(b) The unregistered veterinary practitioner, often known in country districts as the cow-doctor.

"Full provision is made in the Regulations for the use of the drugs in the regular practice of the qualified veterinary surgeon, but this is far from covering the actual requirements. All stock-owners require to keep by them certain preparations for use in cases of emergency, and a large amount of treatment of animals is done, especially in rural districts where a qualified veterinary surgeon may not be available, by men with no legal qualifications but a considerable amount of skill and experience, whose services could not be dispensed with. It was hoped that most of the difficulty in these cases might be got over by the addition to the drug of some denaturant which, while not affecting the medicinal qualities of the preparations, would make them too nauseous for human use. Experiments have been initiated by the Government for ascertaining a suitable substance, but these are not yet sufficiently advanced to enable us definitely to rely on this as the solution. It is hoped that the experiments will yield a positive result in the near future. If the experiments are successful, the drug in the denatured form would be added to Schedule II. and exempted from the operation of the Regulations.

"It therefore became necessary to consider, at any rate for provisional adoption, means by which these two classes might be enabled to get supplies of such drugs as they require for this business without any serious risk of the drugs falling into the hands of the drug-taker.

"The result of our inquiry, however, so far as the farmer or stock-owner is concerned, was to make it very doubtful whether he will necessarily be affected by the Regulations at all. The witnesses who appeared before us said that the only medicines which farmers were in the habit of stocking were tinct. opii, and certain proprietary medicines supplied by certain firms of animal medicine-makers. The latter, it appears, are already, or can easily be made, of such a strength as to be outside the Dangerous Drugs Act, and as regards tinct. opii (laudanum) the President of the Royal Veterinary College stated, and it is generally admitted, that it is never, or need never, be administered except in strengths outside the Act.

"It was suggested that in cases where the head of stock is large and a considerable quantity of tinct. opii might be required, purchase of the drug in a concentrated form (which would be within the Regulations) is more convenient and economical. These cases could be dealt with, if necessary, either by individual licences granted by the Secretary of State, or by some system of certificates, on which the holder would be entitled to buy the preparation he requires, and which would afford a sufficient guarantee to the chemist that the purchaser *bona fide* required the drugs for the purpose of his business. A certificate on a form to be issued by the Home Office might be granted by the local police authority to the effect that the holder is a *bona fide* farmer or stock-owner, and is authorised to purchase tinct. opii for the purpose of his business from a person authorised to sell under the Pharmacy Acts. Provision should be made on the back of the form for the entry by the supplier of the amount purchased, date of purchase, and the name and address of the supplier. The certificate should be kept by the farmer or stock-owner and produced for inspection on demand. As such an arrangement would, we hope, be provisional only, we do not recommend that it should be expressly provided for in the Regulations. Effect can be given to it by an authority issued by the Secretary of State under the Regulations."

The Regulations in their final form, Dr Tocher continued, had now been issued. It should be mentioned that the drugs to which the Regulations applied included cocaine, morphine, and opium, containing in the case of cocaine more than one-tenth per cent cocaine and in the cases of opium and morphine more than one-fifth per cent of morphine. The original draft prohibited the purchase or use of any opiate by a farmer. The administration of the drug was to be in the hands of a veterinary surgeon. The denaturing referred to meant the addition of such a substance as vile-smelling asafetida to laudanum. It meant punishing the animal because it was ill.

The Regulations in their final form still prohibited the purchase and use of opiates by farmers unless specially authorised under Section 7 of the Regulations, which named the classes of persons who might have drugs in their possession. These included persons licensed by the Secretary of State to be in possession of the drug, and also persons to whom the drug was supplied for their use by medical practitioners or veterinary surgeons. If the Regulations were read in conjunction with the Committee's Report, it was clear that some form of licence would require to be in the possession of the farmer when he applied after the 1st September for a small supply of an opiate for stock use. As the law at present stood, any farmer known to the authorised seller could purchase the requisite amount of the drug by signing for the drug and stating the object for which it was to be used. In future this procedure would still be necessary, but in addition to signing for the drug and stating the object for which it was to be used, the farmer would require to show evidence that he was licensed to procure and use the drug before the purchase could be made. Since the Committee recommended that the Home Office licence might be in the hands of the local authority, some action should be taken either by the Society or by farmers generally, prior to the 1st September, in the direction of securing that the licence should be in the simplest possible form, to prevent abuse and to enable stock-owners to get the required remedy as promptly as possible in order to preserve the health of their stock.

Grass Sickness.

Dr TOCHER reported regarding the investigation into grass sickness. He said that since the grants had been made by the Society and the Board of Agriculture for Scotland, which began from the 1st of May last, he had visited Forfarshire and Perthshire six times, and had had consultations with the Local Advisory Committee and the Local Veterinary Surgeons. He had explained to them that during that week or the following, three hundred doses of Anti-botulism serum would be ready for use amongst the horses in the infected area. The idea was to have two hundred of these doses administered for immunisation purposes. One-half of the horses on a farm would be interjugularly injected, and the others left without any hypodermic treatment at all. One hundred doses were to be reserved for curative purposes. If the horse was certified to be attacked by grass sickness, a dose would be immediately injected, and in the course of another day or two a second dose would be given. It could not yet be said whether or not this treatment would be curative, and they could not say whether it would confer immunisation. He believed it would. The Local Committee would be glad if any farmer desiring his horses to be protected would apply to Mr Hugh Martin, the Convener of the Committee, or to himself, or to the Veterinary Surgeon of his area who had the serum. This was to be done by arrangement and not in a sporadic fashion. The Committee hoped to have a list of all the farmers who had applied and the cases treated.

Major SPENCE asked whether there was any means of informing the public what symptoms were to be first seen.

Dr TOCHER said he recommended that every farmer who had a horse sick in any way should apply to a veterinary surgeon. Only he could tell whether a horse was suffering from grass sickness or from some form of mechanical impaction. This was the time of year when grass sickness was suspected, and the farmer, when symptoms of sickness occurred, should send for the veterinary surgeon.

Report by Botanist.

The following report by Mr A. N. M'ALPINE, Botanist to the Society, was submitted:—

"I have the honour to report that during the past season, 1920-21, I have tested and examined about thirty samples of agricultural seeds.

"I have also reported on several plants and fungoid diseases sent to me."

The proceedings terminated with a cordial vote of thanks to the Chairman on the motion of Mr DAVID FERRIS.

GENERAL MEETING OF MEMBERS HELD IN THE SHOWYARD,
STIRLING, 27TH JULY 1921.

His Grace the DUKE OF MONTROSE, K.T., President of the Society,
in the Chair.

The PRESIDENT, in opening the Meeting, said he was sure he only voiced the opinion of the members and the directors of the Highland Society, in addition to his own, when he expressed the pleasure they had in what promised to be a very successful Show. It was early yet to ascertain what the attendance might be, but from what they knew of the previous day and what they saw that day he thought they need have no doubt upon that point. The entries were also very favourable. They were in advance of what they were last year at Aberdeen, and they were in excess, as far as he could ascertain, of any Show that had ever been held in Stirling. That was very satisfactory, taking into consideration that a few weeks ago they were in the middle of an industrial crisis, when there were no railway facilities, and when there were certain difficulties in the removal of live stock. The industrial crisis had passed away and the country was moving in calmer waters. That fact must reflect upon the proceedings of the Highland Society that week. They owed a debt of gratitude to the railway companies for the assistance they had given them? No sooner had the actual crisis come to an end than the railway companies produced all the facilities they were accustomed to give them in pre-war days. They had conveyed the exhibits of live stock and the spectators in a most comfortable way. He hoped that the railway directors would realise that the Highland Society appreciated the services they had rendered them.

Votes of Thanks.

Mr DAVID FERRIE of Parbroath, Cupar-Fife, Chairman of Directors, moved—"That a cordial vote of thanks be accorded to the Provost, Magistrates, and Town Council of Stirling for their assistance and co-operation, and for their liberal support to the Show funds."

He assured them that they who had had much to do with getting up the Show appreciated very highly the manner in which the officials connected with the burgh of Stirling had supported their efforts. In no case had they any trouble, and in no case had they appealed in vain for any help that would make for the benefit of the Society and which they thought deserved to be brought forward. On his first visit to Stirling with the Secretary he was very much impressed with the help the Provost gave them. Any suggestion they made was carried out with the greatest promptitude. The Highland and Agricultural Society desired to record its high appreciation of the services of the Provost, the Magistrates, and the Town Council.

Mr JAMES M'LAREN, Cornton, Convener of Shows Committee, seconded, and the motion was very cordially agreed to.

Bailie O. P. DERRICK, Senior Magistrate of Stirling, in the absence of Provost M'Culloch, returned thanks, and said that the Town Council had always taken a very great interest in the Highland Society's Show. They felt deeply grateful for their kindness, and were proud to see that the Show, so far as it had gone, had been a success. In entries they had made a record, and they only hoped that now the gate would produce a greater record. They had only one desire, and that was that they regretted that they could not have the Highland Show with them at less irregular periods.

Mr CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, Honorary Secretary of the Society, moved—"That a vote of thanks be accorded to the Convener and Members of the Local Committee of Management for the successful manner in which they had carried through the Show arrangements."

Mr Douglas said he was sure that that vote of thanks needed no support in argument. They all wished to express their grateful thanks to those gentlemen for their labours. The work of the Local Committee of Management was an essential part of the success of all their Shows. They had officials of whose experience, efficiency, and activity they were all proud. These were times when officials were not popular with the most of men, but he was sure that any member of the Highland Society who condemned them made a mental reservation in favour of the officials of the Society. But excellent as they were, they would not be able to give full effect to the Society's efforts if it were not for the help they always received from the Local Committee. That labour had always been given willingly and efficiently. They

found that wherever they went with their Show they had any number of friends ready to give them cordial support, because of their sympathy with the work of the Society. It was therefore no unique event that they should have a successful Committee of Management, but if they had one that excelled they found it in Stirling on that occasion. He congratulated them on the success of their work and offered them their most hearty thanks.

Lieut.-Col. F. J. CARRUTHERS of Dormont seconded the motion, which was unanimously carried.

Brig.-Gen. STIRLING of Keir, Convener of the Local Committee, replying on behalf of the Committee, said he thought the Local Committee would agree with him when he said that their task had been made very easy for them by the excellent business-like methods of the Secretary of the Society and of the other officials. So far as the Convener was concerned, he might say that there had been precious little to do. He thought that the secret of the smooth working of the Highland Society and of the way in which its great Show were carried out from year to year were very largely due to their permanent officials, as well as to the loyal support which the Highland Society could count upon from all its members in every district. There in Stirling they were exceptionally fortunate. He thought they had a show-ground which perhaps was the most beautiful sight to be found in the whole of Scotland, and he hoped and believed that the Show then in progress was going to be well worthy of the site which it occupied.

The Duthie Perpetual Challenge Cup.

The SECRETARY reported that he had received the following letter from Mr William Duthie, Collynie, along with the Perpetual Challenge Cup which he had presented to the Society, and which was on the table:—

TARVES, 20th July 1921.

JOHN STIRTON, Esq.,
Secretary,
Highland and Agricultural Society of Scotland, Edinburgh.

DEAR MR STIRTON,—I have pleasure in sending you, as Secretary of the Highland and Agricultural Society, my gift to the Society of the accompanying Perpetual Challenge Cup, to be given at the annual Show for the best animal, male or female, in the Shorthorn Classes.

Along with it I desire to give an annual replica of the Cup to be retained by the holder when the Cup is given up.

I am sorry that I cannot be present with you at this time, but hardly feel fit for the fatigue of the Show.

Trusting your Directors will accept this gift as an expression of goodwill to the breed and to the Society.—I remain, yours faithfully,

WM. DUTHIE, Collynie.

His Grace said that on behalf of the Directors he accepted the Cup, and suggested that the Secretary be asked to communicate with Mr Duthie and express the thanks of the Highland Society for his magnificent gift.

Vote of Thanks to President.

The EARL OF MORAY, Vice-President of the Society, proposed a vote of thanks to the President, the Duke of Montrose. In doing so, he said they all knew the interest His Grace took in matters such as that, Society, and they knew that in obtaining his countenance the Society was going a long way to ensure the success of a venture such as they were engaged in that day. The name of the Duke of Montrose was a name to conjure with, not only in that but in every locality.

The PRESIDENT, the Duke of Montrose, said he was very grateful indeed to Lord Moray for the vote of thanks he had proposed, and he was obliged to them for the very cordial way in which they had received it. It was a great pleasure for him to have been connected with such a successful Show at Stirling. He had already referred to some of the difficulties that they anticipated, and he could only hope that in the future no such critical position might again arise in the country so as to cause the Directors any anxiety. His Grace presumed that landed proprietors, tenant farmers, and agricultural labourers were all equally interested in the progress of their premier industry. They all had their individual troubles. Some were very hard to bear, but

they should overcome them if they had no more interference with their business. After all, the agricultural industry was managed in all its branches by men of experience and great ability. Accordingly His Grace deprecated any Parliamentary interference with it. He hoped that their legislators might devote their attention to finding the ways and means of encouraging agricultural education and research.

ANNIVERSARY GENERAL MEETING, 4TH JANUARY 1922.

THE EARL OF STAIR, D.S.O., *President*, in the Chair.

New Members.

Six hundred and ninety-three candidates for election were balloted for and admitted Members of the Society.

Vacancy on Board of Directors.

On the recommendation of the Board of Directors, William Low of Balmakewan, Marykirk, Montrose, was elected an Ordinary Director for the Aberdeen Division, to fill the vacancy caused by the death of the late Major D. A. Spence.

Finance.

SIR DAVID WILSON of Carbeth, Bart., Convener of the Finance Committee, submitted the Accounts of the Society for the year to 30th November 1921. The receipts for the year from all sources reached a total of £31,556, 8s. 7d. This sum exceeded the outlays by £1795, 1s. 8d., and included life subscriptions to the amount of £1766, 14s. In the past year the expenditure on educational work amounted to £198, 18s. 2d., and on work in the chemical, veterinary, and botanical departments to £679, 14s. 10d.

He moved the approval of the usual grant of £5 to the Society for the Prevention of Cruelty to Animals for the year 1922.

Mr JAMES PHILLIPS, Carse, seconded, and the motion was agreed to.

Argyll Naval Fund.

Mr W. P. GILMOUR, Balmangan, submitted the report on the Argyll Naval Fund for 1920-1921, which showed that the income for the year amounted to £350, 18s. 8d., while the expenditure was £230, in grants to seven naval cadets.

Stirling Show, 1921.

Mr JAMES M'LAREN, Cornton, reported upon the Stirling Show of last year. As on former occasions, the Show was held in the King's Park, an excellent and convenient site. Good weather favoured the Show on the Tuesday and Wednesday, and the attendance of the public on these days was exceptionally large, surpassing the attendance for the corresponding days at Aberdeen in 1920. On Thursday and Friday the weather broke down and there was continuous rain. The attendance on these days suffered accordingly. In spite of this fact the drawings at the gates and grand stand reached a total of £12,764, which is almost three times the amount drawn at Stirling in 1909, and only £1300 less than the drawings at Aberdeen in 1920. The exhibit of live stock was one of the largest and finest ever brought together at one of the annual shows. Implements and machinery also provided a comprehensive and meritorious display. The town of Stirling, in addition to giving a free supply of water, compensated the tenant for loss of crop on the part of the ground which had been under cultivation, and gave a donation of £100 to the Show funds. The estimated profit on the Show was approximately £2350.

Mr W. BAXTER, Tophead, Stanley, complained of the catering arrangements at the Stirling Show, and maintained that as good a luncheon could be got at any restaurant for 2s. as was provided on the Show-ground for several times the cost. If they put the catering up to competition they would obtain much better results.

Mr DAVID FERRIE said he had that day been appointed Steward of catering. He hoped to have the support of gentlemen like Mr Baxter. If, however, they had any suggestions to offer, let them make them at that meeting.

Mr ARCHIBALD MACNEILAGE endorsed what Mr Baxter had said, and congratulated the Directors on having appointed as efficient a man as Mr David Ferrie as Steward of catering.

Mr JOHN RAND, Gainlawhill, Berwick, hoped Mr Ferrie would include in his duties the oversight of the hotel charges. At Stirling these charges were scandalous.

Dumfries Show, 1922.

Col. F. J. CARRUTHERS, Convener of the Shows Committee, reported on the arrangements for the Show of this year, to be held at Dumfries. The date originally fixed for the Show was the 25th to 28th July, but the Directors had found it desirable to alter the date to the 19th to 21st July, to avoid clashing with important shows in England. An excellent site for the Show had been secured at Rotchell Park, on the fields where the Show was held in 1910, and arrangements had been made whereby additional ground would be available if required. The Prize List, which was in course of preparation, was on the usual liberal scale, and the Directors were hopeful—given favourable weather—that the Show would meet with much success.

Mr ARCHIBALD MACNEILAGE called attention to the alteration of the date fixed for the Dumfries Show, and expressed regret that the change should have been made, as it seemed to him without adequate cause. The date was inconvenient in many respects, and the last week in July was the old date of the Highland and Agricultural Society's Shows. It fitted in well between hay harvest and corn harvest, and it avoided the week of the heaviest traffic in the whole year—that of the Glasgow Fair holidays.

The SECRETARY explained that the date was altered on a petition from the Agricultural Implement Dealers' Association. The date clashed with the date of the Yorkshire Agricultural Society's Show at Hull, and the Highland Society were causing this conflict of dates because they were not adhering to their proper date. For many years the Highland Show had followed the Royal Show with a clear week's interval, and if they kept to that arrangement no confusion was caused. He agreed that during Glasgow Fair week passenger traffic on the railway would be very heavy, but it was the goods and live stock traffic which was the serious thing for the Show. He thought the railway companies would be able to handle the passenger traffic, and the fact that goods traffic would not be so heavy that week would probably result in the Society having a better service for goods and live stock.

Inverness Show, 1923.

Mr A. B. LEITCH, Inchstelly, reported that the arrangements for the Show of 1923, to be held at Inverness, were proceeding satisfactorily. The Victoria Park, where the Show was held in 1911, has again been made available as a site, through the courtesy of the Town Council of Inverness, who have expressed their readiness to do everything in their power to further the success of the Show.

Show of 1924.

Mr DAVID FERRIE of Parbroath moved—"That provided a suitable site is available, and satisfactory financial and other arrangements can be made, the Society's Show of 1924 be held in the Perth district."

Mr T. A. BUTTAR, Corston, seconded, and the motion was unanimously agreed to.

Grants to Local Societies.

Mr JOHN M'CAIG of Belmont submitted the report on District Shows and Competitions, showing that in 1921 grants of money and medals had been given in 85 districts. The total expenditure under this head amounted to £676, 13s. 4d. For the current year the Directors proposed the following grants: Under section 1, twenty-two districts for grants of £12 each for cattle, horses, and sheep, and eight districts in intermediate competition, with a grant of three silver medals to each; under section 2, thirteen districts for grants of £15 each for stallions; special grants of £40 to the Highland Home Industries; £20 for Federations of Women's Rural Institutes; £20 to Kilmarnock Cheese Show; £5 to Shetland Agricultural Society; £3 each to North Uist, Rousay, South Ronaldshay, and Burray; a gold medal and a silver medal to the British Dairymaids' Association; sixteen districts for two

medals each; the usual medals at ploughing and hosing competition; two medals each to five districts for cottages and gardens; long service medals and certificates, say £112—making the total sum offered in 1922, £802.

Science.

Report by Chemist.

Dr J. F. TOCHER, Consulting Chemist to the Society, reported on the work of his department during the year 1921.

The substance of Dr Tocher's Report appears on pages 230-239 of this volume.

Education.

Mr CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Convener, reported on the results of the twenty-sixth examination held last autumn for the National Diploma in Dairying. At the examination in England there were 42 candidates, of whom 24 obtained the diploma and 18 failed; at the examination at Kilmarnock there were 49 candidates, 37 getting the diploma and 12 failing. The Diploma with Honours was awarded to two of the successful candidates at the English centre, and two at the Scottish centre. The names of the successful candidates, as well as the names of the winners of the National Diploma in Agriculture at the examination held last April, will be published in the next volume of 'Transactions.'

The examinations for these diplomas will again be held during the ensuing year.

The Society's examinations for First and Second Class Certificates in Forestry, which are held in alternate years, will be held here this year on 21st, 22nd, and 23rd March, provided a sufficient number of candidates present themselves for examination.

Trial of Tractors, 1922.

Professor STANFIELD, on behalf of the Convener of the Implement Committee, directed attention to the agricultural tractor and implement trials which it was proposed to hold next autumn. It was important to get a suitable place to hold the trials. About 120 acres would be necessary in a central locality.

On the motion of Sir HUGH SHAW STUART, Bart., a cordial vote of thanks was accorded to the Earl of Stair for presiding.

APPENDIX

PREMIUMS

OFFERED BY

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND IN 1922

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GENERAL NOTICE.

THE HIGHLAND SOCIETY was instituted in the year 1784, and incorporated by Royal Charter in 1787. Its operation was at first limited to matters connected with the improvement of the Highlands of Scotland; but the supervision of certain departments, proper to that part of the country, having been subsequently committed to special Boards of Management, several of the earlier objects contemplated by the Society were abandoned, while the progress of agriculture led to the adoption of others of a more general character. The exertions of the Society were thus early extended to the whole of Scotland, and have since been continuously directed to the promotion of the science and practice of agriculture in all its branches.

In accordance with this more enlarged sphere of action, the original title of the Society was altered, under a Royal Charter, in 1834, to **THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND**.

Among the more important measures which have been effected by the Society are—

1. Agricultural Meetings and General Shows of Stock, Implements, &c., held in the principal towns of Scotland, at which exhibitors from all parts of the United Kingdom are allowed to compete.

2. A system of District Shows instituted for the purpose of improving the breeds of Stock most suitable for different parts of the country, and of aiding and directing the efforts of Local Agricultural Associations.

3. The encouragement of Agricultural Education, under powers conferred by a supplementary Royal Charter, granted in 1856, and authorising the Society to grant Diplomas to Students of Agriculture; and by giving grants in aid of education in Agriculture and allied sciences. In 1900 the Society discontinued its own Examination, and instituted jointly with the Royal Agricultural Society of England an Examination for a National Diploma in Agriculture.

4. The advancement of the Veterinary Art, by conferring Certificates on Students who have passed through a prescribed curriculum, and who are found, by public examination, qualified to practise. Terminated in 1881 in accordance with arrangements with the Royal College of Veterinary Surgeons.

5. The institution of a National Examination in Dairying, jointly with the Royal Agricultural Society of England.

6. The institution of an Examination in Forestry for First and Second Class Certificates.

7. The appointment of a chemist for the purpose of promoting the application of science to agriculture.

8. The establishment of a Botanical Department.

9. The appointment of Entomologist to advise members regarding insect pests.

10. The annual publication of the 'Transactions,' comprehending papers by selected writers, Prize Reports, and reports of experiments, also an abstract of the business at Board and General Meetings, and other communications.

11. The management of a fund left by John, 5th Duke of Argyll (the original President of the Society), to assist young natives of the Highlands who enter His Majesty's Navy.

CONSTITUTION AND MANAGEMENT.

The general business of **THE HIGHLAND AND AGRICULTURAL SOCIETY** is conducted under the sanction and control of the Royal Charters, referred to above, which authorise the enactment of Bye-Laws.

The Office-Bearers consist of a President, Four Vice-Presidents, Thirty-two Ordinary and Twenty Extraordinary Directors, a Treasurer, an Honorary and an Acting Secretary, an Auditor, and other Officers.

The Supplementary Charter of 1856 provides for the appointment of a Council on Education, consisting of Sixteen Members—Nine nominated by the Charter, and Seven elected by the Society.

PRIVILEGES OF MEMBERS

MEMBERS OF THE SOCIETY ARE ENTITLED—

1. *To receive a free copy of the 'Transactions' annually.*
2. *To apply for District Premiums that may be offered.*
3. *To report Ploughing Matches for Medals that may be offered.*
4. *To Free Admission to the Shows of the Society.*
5. *To exhibit Live Stock and Implements at reduced rates.¹*
6. *To have Manures and Feeding-Stuffs analysed at reduced fees.*
7. *To have Seeds tested at reduced fees.*
8. *To have Insect Pests and Diseases affecting Farm Crops inquired into.*
9. *To attend and vote at General Meetings of the Society.*
10. *To vote for the Election of Directors, &c., &c.*

ANALYSIS OF MANURES AND FEEDING-STUFFS

The Fees of the Society's Chemist for Analyses made for Members of the Society shall, until further notice, be as follow :—

The estimation of one ingredient in a manure or feeding-stuff	5s.
The estimation of two or more ingredients in a manure or feeding-stuff	10s.

These charges apply only to analyses made for the sole and private use of Members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

The Society's Chemist, if requested, also supplies valuations of manures, according to the Society's scale of units.

SEEDS, CROP DISEASES, INSECT PESTS, &c.

The rates of charges for the examination of plants and seeds, crop diseases, insect pests, &c., will be had on application to the Secretary.

ELECTION OF MEMBERS

Candidates for admission to the Society must be proposed by a Member, and are elected at the half-yearly General Meetings in January and June. It is not necessary that the proposer should attend the Meeting.

CONDITIONS OF MEMBERSHIP

Higher Subscription.—The ordinary annual subscription is £1, 3s. 6d., and the ordinary subscription for life-membership is £12, 12s.; or after ten annual payments have been made, £7, 7s.

Lower Subscription.—Proprietors farming the whole of their own lands, whose rental on the Valuation Roll does not exceed £500 per annum, and all Tenant-Farmers, Secretaries or Treasurers of Local Agricultural Associations, Factors resident on Estates, Land Stewards, Foresters, Agricultural Implement Makers, and Veterinary Surgeons, none of them being also owners of land to an extent exceeding £500 per annum, and such other persons as, in respect of their official or other connection with Agriculture, the Board of Directors may consider eligible, are admitted on a subscription of 10s. annually, which may be redeemed by one payment of £7, 7s., and after eight annual payments of 10s. have been made, a Life Subscription may be purchased for £5, 5s., and after twelve such payments, for £3, 3s.² Subscriptions are payable on election, and afterwards annually in January.

Members are requested to send to the Secretary the names and addresses of Candidates they have to propose (stating whether the Candidates should be on the £1, 3s. 6d. or 10s. list).

JOHN STIRTON, *Secretary.*

3 GEORGE IV. BRIDGE, EDINBURGH.

¹ Firms are not admitted as Members; but if one partner of a firm becomes a Member, the firm is allowed to exhibit at Members' rates.

² Candidates claiming to be on the 10s. list must state under which of the above designations they are entitled to be placed on it.

ESTABLISHMENT FOR 1921-1922.

President.

EARL OF STAIR, D.S.O., Lochinch, Castle Kennedy Station.

Vice-Presidents.

Right Hon. Sir HERBERT E. MAXWELL of Monreith, Bart., D.C.L.,
LL.D., F.R.S., Whauphill.
Colonel R. F. DUDGEON, C.B., of Cargen, Dumfries."
W. J. H. MAXWELL of Munches, Dalbeattie.
CHARLES BROOK of Kinmount, Annan.

Year of
Election.

Ordinary Directors.

- | | |
|------|--|
| | ROBERT MACMILLAN of Holm of Dalquhairn, Woodlea, Moniaive.
Sir KENNETH MACKENZIE of Gairloch, Bart., Convent House, Ross-shire.
DAVID FERRIE of Parbroath, Cupar-Fife.
WILLIAM DONALD, Fardalehill, Kilmarnock.
ROBERT DICKINSON, Longcroft, Oxtou.
PHIPPS O. TURNBULL, Smeaton, Dalkeith.
Colonel J. L. REID of Cromley Bank, Ellon.
J. ERNEST KERR of Harviestoun Castle, Dollar.
R. A. SMITH, Wester Lovat, Beauly.
WILLIAM MEIKLEM, Begg, Kirkcaldy.
Sir HUGH SHAW STEWART, C.B., of Greenock and Blackhall, Bart.,
Ardgowan, Greenock. |
| 1918 | H. B. MARSHALL of Rachan, Broughton.
THOMAS KIRK of Abbey Mains, Haddington.
JAMES DURNO, Upper Mill, Tarves.
JAMES M'LAREN, Cornton, Stirling.
W. P. GILMOUR, Balmangan, Kirkcudbright.
THOMAS A. BUTTAR, Corston, Coupar-Angus.
JOHN SPEIR, Newton Farm, Newton, Glasgow.
JAMES GRIEVE, Rumbletonlaw, Greenlaw. |
| 1919 | J. T. M'LAREN, The Leuchold, Dalmeny House, Edinburgh.
WILLIAM LOW of Balmakewan, Marykirk, Montrose (elected Jan. 1922).
JAMES R. LUMSDEN of Arden, Dumbartonshire.
JAMES M'QUEEN of Crofts, Dalbeattie.
General Sir WALTER CHARTERIS ROSS of Cromarty, Cromarty.
Lieut.-Col. W. T. R. HOULDSWORTH of Kirkbride, Maybole.
Major MARK SPROT of Riddell, Lilliesleaf. |
| 1920 | ..... |
| 1921 | JOHN P. SLEIGH, St John's Wells, Fyvie.
ALEXANDER ROBERTSON, Estate Office, Polmaise, Stirling.
GEORGE WILL, Crichton Royal Institution, Dumfries.
ANDREW B. LEITCH, Inchstelly, Alves, Forres.
The DUKE OF ATHOLL, K.T., C.B., M.V.O., D.S.O., Blair Castle, Blair
Atholl. |

Extraordinary Directors.

- | | | |
|------|---|--|
| 1920 | { | HUGH MARTIN, Flowerdale, Kinrossie, Perth. |
| | | Colonel F. J. CARRUTHERS of Dormont, Lockerbie. |
| | | JOHN ELLIOT of Meikle, Clovenfords. |
| | | ROBERT MACDIARMID, Corries, Lochawe. |
| | | ROBERT PARK, Brunstane, Portobello. |
| 1921 | { | MOFFAT S. THOMSON of Lambden, Spotsmains, Kelso. |
| | | ALEXANDER COWAN, Valleyfield, Penicuik. |
| | | ALEXANDER FORBES, Rettie, Banff. |
| | | WILLIAM POOLE, J.P., Englewood, Blackhall. |
| | | G. BERTRAM SHIELDS, Dolphinstone, Tranent. |

Shew District.

- | | | |
|------|---|--|
| 1921 | { | J. BRYCE DUNCAN of Newlands, Dumfries. |
| | | Major C. R. DUDGEON, Cargen Holm, Dumfries. |
| | | F. N. M. GOURLAY, Milnton, Tynron, Thornhill. |
| | | JOHN M'CAIG of Belmont, Stranraer. |
| | | THOMAS S. MACAULAY, O.B.E., Provost of Dumfries. |
| | | J. G. M'MYN, Kirkhouse, Kirkbean, Dumfries. |
| | | A. M. MONTGOMERY of Netherhall, Castle Douglas. |
| | | R. JARDINE PATERSON of Balgray, Lockerbie. |
| | { | JAMES PHILLIPS, Carse, Kirkcudbright. |
| | | C. W. RALSTON, Dabton, Thornhill. |

Office-Bearers.

- Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, *Treasurer*.
 CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, *Honorary Secretary*.
 Rev. A. WALLACE WILLIAMSON, D.D., 44 Palmerston Place, *Chaplain*.
 JOHN STIRTON, *Secretary*.
 EDWARD M. COWIE, *Chief Clerk and Cashier*.
 R. C. TODD, *Second Clerk*.
 WILLIAM HOME COOK, C.A., 42 Castle Street, *Auditor*.
 J. F. TOCHER, D.Sc., F.I.C., 41½ Union Street, Aberdeen, *Chemist*.
 Professor R. STANFIELD, A.R.S.M., M.Inst.C.E., F.R.S.E., 24 Mayfield Gardens, Edinburgh, *Consulting Engineer*.
 A. N. M'ALPINE, 6 Blythswood Square, Glasgow, *Consulting Botanist*.
 R. S. MACDOUGALL, M.A., D.Sc., 9 Dryden Place, *Consulting Entomologist*.
 TODD, MURRAY, & JAMIESON, W.S., 66 Queen Street, *Law Agents*.
 WILLIAM BLACKWOOD & SONS, 45 George Street, *Publishers*.
 HENRY MUNRO, Ltd., 82 Mitchell Street, Glasgow, *Advertising Agents*.
 HAMILTON & INCHES, Princes Street, *Silversmiths*.
 ALEXANDER KIRKWOOD & SON, 9 St James' Square, *Medallists*.
 JOHN REID, *Showyard Erector*, 55 Blenheim Place, Aberdeen.
 ANDREW BROWN, *Messenger*.

Chairman of Board of Directors.

SIR HUGH SHAW STEWART, Bart., C.B.

Chairmen of Committees.

- | | |
|--------------------------------------|---|
| 1. <i>Argyll Naval Fund</i> | Colonel Sir JOHN GILMOUR, Bart., M.P., D.S.O. |
| 2. <i>Finance, Chambers, and Law</i> | Sir DAVID WILSON, Bart., D.Sc., of Carbeth. |
| 3. <i>Publications</i> | CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan. |
| 4. <i>Shows</i> | Colonel F. J. CARRUTHERS of Dormont. |
| 5. <i>Implement and Machinery</i> | PHIPPS O. TURNBULL, Smeaton. |
| 6. <i>Science</i> | Sir DAVID WILSON, Bart., D.Sc., of Carbeth. |
| 7. <i>General Purposes</i> | Sir HUGH SHAW STEWART, Bart., C.B. |
| 8. <i>Education</i> | CHARLES DOUGLAS, D.Sc., C.B. |
| 9. <i>Forestry</i> | Sir ARCHIBALD BUCHAN HEPBURN, Bart. |
| 10. <i>Law and Parliamentary</i> | Sir HUGH SHAW STEWART, Bart., C.B. |

COMMITTEES FOR 1921-1922.

1. ARGYLL NAVAL FUND.

Colonel Sir JOHN GILMOUR, Bart., M.P., D.S.O., of Montrave, Leven,
Convener.

CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow.

DAVID FERRIE of Parbroath, Cupar-Fife.

Sir ARCHIBALD BUCHAN HEPBURN of Smeaton, Bart., Letham, Haddington.

Sir KENNETH MACKENZIE of Gairloch, Bart., Conon House, Ross-shire.

MACLACHLAN OF MACLACHLAN, Castle Lachlan, Strachur.

General ARCHIBALD STIRLING of Keir, Dunblane.

Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn.

Sir HUGH SHAW STEWART, C.B., of Greenock and Blackhall, Bart.,
Ardgowan, Greenock, *ex officio.*

2. FINANCE, CHAMBERS, AND LAW.

Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, *Convener.*

ALEXANDER COWAN, Valleyfield, Penicuik.

JAS. I. DAVIDSON, Saughton Mains, Corstorphine.

DAVID FERRIE of Parbroath, Cupar-Fife.

J. ERNEST KERR of Harviestoun Castle, Dollar.

JAMES R. LUMSDEN of Arden, Dumbartonshire.

JAMES M'LAREN, Cornton, Stirling.

J. T. M'LAREN, The Leuchold, Dalmeny House.

ROBERT MACMILLAN of Holm of Dalquhairn, Woodlea, Moniaive.

G. BERTRAM SHIELDS, Dolphingstone, Trautent.

Sir HUGH SHAW STEWART, C.B., of Greenock and Blackhall, Bart.,
Ardgowan, Greenock.

CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, *Hon.*
Secretary, ex officio.

WILLIAM HOME COOK, C.A., Auditor, *ex officio.*

3. PUBLICATIONS.

CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, *Hon.*
Secretary, Convener.

THOMAS A. BUTTAR, Corston, Coupar-Angus.

Colonel F. J. CARRUTHERS of Dormont, Lockerbie.

ALEXANDER COWAN, Valleyfield, Penicuik.

Major C. R. DUDGEON, Cargen Holm, Dumfries.

DAVID FERRIE of Parbroath, Cupar-Fife.

Lieut.-Col. W. S. R. HOULDSWORTH of Kirkbride, Maybole.

JOHN M'CAIG of Belmont, Stranraer.

ROBERT MACMILLAN of Holm of Dalquhairn, Woodlea, Moniaive.

G. BERTRAM SHIELDS, Dolphingstone, Trautent.

JOHN SPEIR, Newton Farm, Newton.

Sir HUGH SHAW STEWART, Bart., C.B., of Greenock and Blackhall,
Ardgowan, Greenock.

PHIPPS O. TURNBULL, Smeaton, Dalkeith.

GEORGE WILL, Crichton Royal Institution, Dumfries.

Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn.

4. SHOWS.

Lieut.-Col. F. J. CARRUTHERS of Dormont, Lockerbie, *Convener.*

A. B. LEITCH, Inchstelly, Alves, Forres, *Vice-Convener.*

THOMAS A. BUTTAR, Corston, Coupar-Angus.

ALEXANDER COWAN, Valleyfield, Penicuik.

ROBERT DICKINSON, Longcroft, Oxton.

WILLIAM 'DONALD, Fardalehill, Kilmarnock.
 Major C. R. DUDGEON, Cargen Holm, Dumfries.
 J. BRYCE DUNCAN of Newlands, Dumfries.
 JAMES DURNO, Uppermill, Tarves.
 JOHN ELLIOT, Meigle, Galashiels.
 DAVID FERRIE of Parbroath, Cupar-Fife.
 ALEXANDER FORBES, Rettie, Banff.
 W. P. GILMOUR, Balmangan, Kirkcudbright.
 F. N. M. GOURLAY, Milnton, Tynron, Thornhill.
 JAMES GRIEVE, Rumbletonlaw, Greenlaw.
 Lieut.-Col. W. T. R. HOULDSWORTH of Kirkbride, Maybole.
 J. ERNEST KERR of Harviestoun Castle, Dollar.
 THOMAS KIRK of Abbey Mains, Haddington.
 WILLIAM LOW of Balmakewan, Marykirk, Montrose.
 JAMES R. LUMSDEN of Arden, Dumbartonshire.
 THOMAS S. MACAULAY, O.B.E., Provost of Dumfries.
 JOHN M'CAIG of Belmont, Stranraer.
 R. MACDIARMID, Corries, Lochawe.
 Sir KENNETH MACKENZIE of Gairloch, Bart., Conon House, Ross-shire.
 J. T. M'LAREN, The Leuchold, Dalmeir House.
 JAMES M'LAREN, Cornton, Stirling.
 ROBERT MACMILLAN of Holm of Dalquhairn, Woodlea, Moniaive.
 J. G. M'MYN, Kirkhouse, Kirkbean, Dumfries.
 A. M. MONTGOMERY of Netherhall, Castle Douglas.
 JAMES M'QUEEN of Crofts, Dalbeattie.
 HUGH MARTIN, Flowerdale, Kinrossie, Perth.
 H. B. MARSHALL of Rachan, Broughton.
 WILLIAM MEIKLEM, Begg, Kirkcaldy.
 ROBERT PARK, Brunstane, Portobello.
 R. JARDINE PATERSON of Balgray, Lockerbie.
 JAMES PHILLIPS, Carse, Kirkcudbright.
 WILLIAM POOLE, J.P., Englewood, Blackhall.
 C. W. RALSTON, Dabton, Thornhill.
 Colonel J. L. REID of Cromley Bank, Ellon.
 ALEXANDER ROBERTSON, Estate Office, Polmaise, Stirling.
 G. BERTRAM SHIELDS, Dolphingstone, Tranent.
 JOHN P. SLEIGH, St John's Wells, Fyvie.
 R. A. SMITH, West Lovat, Beaulieu.
 JOHN SPEIR, Newton Farm, Newton.
 Major MARK SPROT of Riddell, Lilliesleaf.
 Sir HUGH SHAW STEWART of Greenock and Blackhall, Bart., C.B.,
 Ardgowan.
 MOFFAT S. THOMSON of Lambden, Spotsmains, Kelso.
 PHIPPS O. TURNBULL, Smeaton, Dalkeith.
 GEORGE WILL, Crichton Royal Institution, Dumfries.
 Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, Treasurer, *ex officio*
 CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, Hon.
 Secretary, *ex officio*.
 Professor R. STANFIELD, 24 Mayfield Gardens, Edinburgh, Engineer, *ex officio*.

5. IMPLEMENTS AND MACHINERY.

PHIPPS O. TURNBULL, Smeaton, Dalkeith, *Convener*.
 Major C. R. DUDGEON, Cargen Holm, Dumfries.
 JOHN ELLIOT, Meigle, Clovenfords.
 DAVID FERRIE of Parbroath, Cupar-Fife.
 ALEXANDER FORBES, Rettie, Banff.
 W. P. GILMOUR, Balmangan, Kirkcudbright.
 THOMAS KIRK of Abbey Mains, Haddington.
 ANDREW B. LEITCH, Inchstelly, Alves.
 WILLIAM LOW of Balmakewan, Marykirk, Montrose.
 Sir KENNETH MACKENZIE of Gairloch, Bart., Conon House, Ross-shire.
 JAMES M'LAREN, Cornton, Stirling.

J. T. M'LAREN, The Leuchold, Dalmeny House.
 HUGH MARTIN, Flowerdale, Kinrossie, Perth.
 ROBERT PARK, Brunstane, Portobello.
 WILLIAM POOLE, J.P., Englewood, Blackhall.
 Colonel J. L. REID of Cromley Bank, Eilon.
 G. BERTRAM SHIELDS, Dolphingstone, Tranent.
 JOHN P. SLEIGH, St John's Wells, Fyvie.
 R. A. SMITH, West Lovat, Beauly.
 JOHN SPEIR, Newton Farm, Newton.
 Major MARK SPROT of Riddell, Lilliesleaf.
 MOFFAT S. THOMSON of Lambden, Spotsmains, Kelso.
 GEORGE WILL, Crichton Royal Institution, Dumfries.
 Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, *ex officio*.
 CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, *ex officio*.
 Professor STANFIELD, 24 Mayfield Gardens, *ex officio*.
 Sir HUGH SHAW STEWART, Bart., C.B., of Greenock and Blackhall,
 Ardgowan, Greenock, *ex officio*.

6. SCIENCE.

Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, *Convener*.
 CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, Hon. Secretary,
Vice-Convener.
 T. A. BUTTAR, Corston, Cupar-Angus.
 ALEXANDER COWAN, Valleyfield, Penicuik.
 DAVID FERRIE of Parbroath, Cupar-Fife.
 W. P. GILMOUR, Balmangan, Kirkcudbright.
 JAMES GRIEVE, Rumbledonlaw, Greenlaw.
 Lieut.-Col. W. T. R. HOULDSWORTH of Kirkbride, Maybole.
 J. ERNEST KERR of Harviestoun Castle, Dollar.
 THOMAS KIRK of Abbey Mains, Haddington.
 ANDREW B. LEITCH, Inchstelly, Alves.
 The MARQUESS OF LINLITHGOW, Hopetoun House, South Queensferry.
 JOHN M'CAIG of Belmont, Stranraer.
 R. MACDIARMID, Corries, Lochawe.
 Sir KENNETH MACKENZIE of Gairloch, Bart., Conon House, Ross-shire.
 JAMES M'LAREN, Cornton, Stirling.
 ROBERT MACMILLAN of Holm of Dalquhairn, Woodlea, Moniaive.
 JAMES M'QUEEN of Crofts, Dalbeattie.
 H. B. MARSHALL of Rachan, Broughton.
 HUGH MARTIN, Flowerdale, Kinrossie, Perth.
 ROBERT PARK, Brunstane, Portobello.
 JAMES PHILLIPS, Carse, Kirkcudbright.
 ALEXANDER ROBERTSON, Estates Office, Polmaise, Stirling.
 General Sir W. C. ROSS of Cromarty, Cromarty.
 G. BERTRAM SHIELDS, Dolphingstone, Tranent.
 JOHN SPEIR, Newton Farm, Newton.
 Sir HUGH SHAW STEWART, Bart., C.B., of Greenock and Blackhall,
 Ardgowan, Greenock.
 MOFFAT S. THOMSON of Lambden, Spotsmains, Kelso.
 PHIPPS O. TURNBULL, Smeaton, Dalkeith.
 Dr J. F. TOOHER, Chemist, *ex officio*.
 A.*N. M'ALPINE, Botanist, *ex officio*.
 R. S. MACDOUGALL, D.Sc., Zoologist, *ex officio*.

7. GENERAL PURPOSES.

Sir HUGH SHAW STEWART, Bart., C.B., of Greenock and Blackhall,
 Ardgowan, *Convener*.
 ALEXANDER COWAN, Valleyfield, Penicuik.
 ROBERT DICKINSON, Longcroft, Oxton.
 JOHN ELLIOT of Meikle, Clovenfords.
 DAVID FERRIE of Parbroath, Cupar-Fife.
 THOMAS KIRK of Abbey Mains, Haddington.

JAMES M'LAREN, Cornton, Stirling.
 J. T. M'LAREN, The Leuchold, Dalmeny House.
 ROBERT MACMILLAN of Holm of Dalquhairn, Woodlea, Moniaive.
 JAMES M'QUEEN of Crofts, Dalbeattie.
 WILLIAM MEIKLEM, Begg, Kirkcaldy.
 ROBERT PARK, Brunstane, Portobello.
 WILLIAM POOLE, J.P., Englewood, Blackhall.
 G. BERTRAM SHIELDS, Dolphingstone, Tranent.
 PHIPPS O. TURNBULL, Smeaton, Dalkeith.
 Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, Treasurer, *ex officio*.
 CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, Hon. Secretary, *ex officio*.

8. EDUCATION.

CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, *Convener*.
 Colonel F. J. CARRUTHERS of Dormont, Lockerbie.
 DAVID FERRIE of Parbroath, Cupar-Fife.
 Sir HUGH SHAW STEWART, C.B., of Greenock and Blackhall, Bart., Ardgowan, Greenock.
 Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn.
 JOHN STIRTON, *Secretary*, Highland and Agricultural Society.

9. FORESTRY.

Sir ARCHIBALD BUCHAN HEPBURN of Smeaton, Bart., Letham, Haddington, *Convener*.
 A. H. ANDERSON, Kippendavie, Dunblane.
 The DUKE OF ATHOLL, K.T., C.B., M.V.O., D.S.O., Blair Castle, Blair Atholl.
 Lieut.-Col. F. J. CARRUTHERS of Dormont, Lockerbie.
 JAMES I. DAVIDSON, Saughton Mains, Corstorphine.
 CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow.
 Sir HENRY DUNDAS, Bart., M.V.O., Polton House, Lasswade.
 Sir JOHN R. FINDLAY of Aberlour, 27 Drumsheugh Gardens, Edinburgh.
 LORD FORTEVIOT, Dupplin Castle, Perth.
 Colonel Sir JOHN GILMOUR, Bart., M.P., D.S.O., of Montrave, Leven.
 EARL OF HOME, Springhill, Coldstream.
 J. H. MILNE HOME, Irvine House, Canonbie.
 DAVID KEIR, Ladywell, Dunkeld.
 LORD LOVAT, C.B., D.S.O., &c., Beaufort Castle, Beaulieu.
 A. D. MACDONALD, Yester Estates Office, Gifford.
 Sir KENNETH MACKENZIE of Gairloch, Bart., Conon House, Ross-shire.
 MACLACHLAN OF MACLACHLAN, Castle Lachlan, Strachur.
 J. G. M'MYN, Kirkhouse, Kirkbean, Dumfries.
 H. B. MARSHALL of Rachan, Broughton.
 Right Hon. Sir HERBERT E. MAXWELL of Monreith, Bart., Whauphill.
 JOHN MICHIE, M.V.O., Kincaim, Blair, Aberdeen.
 LORD POLWARTH, Humble House, Upper Keith.
 Major MARK SPOT of Riddell, Lilliesleaf.
 Sir HUGH SHAW STEWART, Bart., C.B., of Greenock and Blackhall, Ardgowan.
 Colonel ARCHIBALD STIRLING of Keir, Dunblane.
 Sir JOHN STIRLING MAXWELL of Pollok, Bart., Pollokshaws.
 Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn.

10. OFFICE-BEARERS.

Constitution: (1) The four Ordinary Directors for the district in which the Show for the year is to be held (with the exception of one retiring next year);
 (2) one Ordinary Director from each of the other Show districts; and
 (3) the Chairman of the Board, Hon. Secretary, and Treasurer, *ex officio*.

<i>Inverness</i>	{ R. A. SMITH, Wester Lovat, Beaulieu. General Sir WALTER CHARTERIS ROSS of Cromarty.
<i>Perth</i>	{ ANDREW B. LEITCH, Inchstelly, Alves, Forres. WILLIAM MEIKLEM, Begg, Kirkcaldy.
<i>Glasgow</i>	Lieut.-Col. W. T. R. HOULDSWORTH of Kirkbride, Maybole.

- Borders** . JAMES GRIEVE, Rumbletonlaw, Greenlaw.
Edinburgh . J. T. M'LAREN, The Leuchold, Dalmeny House.
Aberdeen . J. P. SLEIGH, St John's Wells, Fyvie.
Stirling . JAMES M'LAREN, Cornton, Stirling.
Dumfries . W. P. GILMOUR, Balmangan, Kirkcudbright.
 Sir HUGH SHAW STEWART, C.B., of Greenock and Blackhall, Bart.,
 Chairman, *ex officio*.
 CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Hon. Secretary, *ex officio*.
 Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, Treasurer, *ex officio*.

11. LAW AND PARLIAMENTARY.

- Glasgow** . JOHN SPEIR, Newton Farm, Newton.
Perth . T. A. BUTTAR, Corston, Coupar-Angus.
Stirling . ALEXANDER ROBERTSON, Estate Office, Polmaise, Stirling.
Edinburgh . THOMAS KIRK of Abbey Mains, Haddington.
Aberdeen . JOHN P. SLEIGH, St John's Wells, Fyvie.
Dumfries . JOHN M'CAIG of Belmont, Stranraer.
Inverness . R. A. SMITH, Wester Lovat, Beauly.
Border . JOHN ELLIOT, Meikle, Clovenfords.
 DAVID FERRIE of Parbroath, Cupar-Fife.
 G. BERTRAM SHIELDS, Dolphingstone, Tranent.
 Sir HUGH SHAW STEWART of Greenock and Ardgowan, Bart., C.B.,
 Chairman, *ex officio* (Convener).
 Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, Treasurer, *ex officio*.
 CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, Hon.
 Secretary, Vice-Convener, *ex officio*.

REPRESENTATIVES ON OTHER BODIES.

National Agricultural Examination Board.

- Colonel F. J. CARRUTHERS of Dormont, Lockerbie.
 CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow.
 DAVID FERRIE of Parbroath, Cupar-Fife.
 Sir HUGH SHAW STEWART, C.B., of Greenock and Blackhall, Bart.,
 Ardgowan, Greenock.
 Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn.
 JOHN STIRTON, Secretary, Highland and Agricultural Society.

Board of Scientific Societies.

- CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow.

Edinburgh and East of Scotland College of Agriculture.

- JOHN STIRTON, Secretary, Highland and Agricultural Society.

West of Scotland Agricultural College.

- Sir HUGH SHAW STEWART, Bart., C.B., of Ardgowan and Blackhall,
 Ardgowan, Greenock.

Aberdeen and North of Scotland College of Agriculture.

- Dr J. F. TOCHER, 41½ Union Street, Aberdeen.

Royal (Dick) Veterinary College.

- THOMAS KIRK of Abbey Mains, Haddington.

Glasgow Veterinary College.

- JAMES R. LUMSDEN of Arden, Dumbartonshire.

Scottish Milk Records Association.

- JOHN M'CAIG of Belmont, Stranraer.
 ROBERT PARK, Brunstane, Portobello.
 Sir HUGH SHAW STEWART, Bart., C.B., of Greenock and Blackhall.

MEETINGS.

General Meetings.—By the Charter the Society must hold two General Meetings each year, and, under ordinary circumstances, they are held in the months of January and June, in the Society's Hall, 3 George IV. Bridge, for the election of Members and other business. Twenty a quorum.

By a resolution of the General Meeting on 15th January 1879, a General Meeting of Members is held in the Showyard on the occasion of the Annual Show. This year it will be held at Dumfries, on Wednesday, 19th July, at an hour to be announced in the programme of the Show.

With reference to motions at General Meetings, Bye-Law No. 10 provides—"That at General Meetings of the Society no motion or proposal (except of mere form or courtesy) shall be submitted or entertained for immediate decision unless notice thereof has been given a week previously to the Board of Directors, without prejudice, however, to the competency of making such motion or proposal to the effect of its being remitted to the Directors for consideration, and thereafter being disposed of at a future General Meeting."

General Show at Dumfries—18th, 19th, 20th, and 21st July.—Entries close for Implements, 15th May; Stock, Poultry, Dairy Produce, &c., 1st June.

Directors' Meetings.—The Board of Directors meet (except when otherwise arranged) on the first Wednesday of each month from November till June inclusive, at half-past one o'clock P.M., and occasionally as business may require, on a requisition by three Directors to the Secretary, or on intimation by him. Seven a quorum.

Committee Meetings.—Meetings of the various Committees are held as required.

Nomination of Directors.—Meetings of Members, for the purpose of nominating Directors to represent the Show Divisions on the Board for the year 1922-1923, will be held at the places and on the days after mentioned:—

1. Edinburgh, Market Buildings, Gorgie, Wed., 31st Jan. 1923, at 1.
2. Cupar, County Buildings, Tues., 20th Feb. 1923, at 1.
(In 1924 and 1925 the Meetings will be held at Perth.)
3. Glasgow, North British Railway Hotel, Wed., 14th Feb. 1923, at 1.
4. Stirling, Golden Lion Hotel, Thur., 15th Feb. 1923, at 1.30.
5. Border, Railway Hotel, St Boswells, Thur., 22nd Feb. 1923, at 1.
6. Aberdeen, Imperial Hotel, Fri., 2nd Mar. 1923, at 2.30.
7. Inverness, Station Hotel, Tues., 6th Mar. 1923, at 12.30.
8. Dumfries, King's Arms Hotel, Wed., 14th Mar. 1923, at 1.30.

The nomination of Proprietor or other Member paying the higher subscription must be made in the 1st, 2nd, 3rd, and 5th Divisions; and the nomination of Tenant-Farmer or other Member paying the lower subscription, in the 4th, 6th, 7th, and 8th Divisions.

Retiring Directors are not eligible for re-election until after the lapse of at least one year.

EXAMINATIONS.

Agriculture.—The Examination for 1922 for the National Diploma in Agriculture will be held at the University, Leeds, on Thursday, 30th March 1922, and following days. Entries close on 25th February.

Dairy.—The Examination for 1922 for the National Diploma in Dairying will be held at the Dairy School, Kilmarnock, on Friday, 22nd September, and following days. Entries close on 12th August.

Forestry.—The Examination for the Society's Certificates in Forestry will be held at 3 George IV. Bridge, Edinburgh, on 28th, 29th, and 30th March 1922.

AGRICULTURAL EDUCATION

By a Supplementary Charter under the Great Seal, granted in 1856, the Society is empowered to grant Diplomas.

From 1858 to 1899 the Society held an annual Examination for Certificate and Diploma in Agriculture. In 1872 the Free Life Membership of the Society was granted to winners of the Diploma. In 1884 permission was given to holders of the Diploma to append the letters F.H.A.S. to their names.

In 1898 it was resolved by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland to discontinue the independent Examinations in Agriculture held by the two Societies, and to institute in their stead a Joint-Examination for a NATIONAL DIPLOMA IN AGRICULTURE (N.D.A.) This Examination is now conducted under the management of the "National Agricultural Examination Board" appointed by the two Societies. In the year 1903, on the invitation of the two Societies, the Ministry of Agriculture and Fisheries and the Scottish Education Department agreed to appoint a representative from each to act on the Examination Board. Sir Daniel Hall, K.C.B., represents the former, and Sir John Struthers, K.C.B., the latter body.

REGULATIONS FOR EXAMINATION IN THE SCIENCE AND PRACTICE OF AGRICULTURE

1. The Societies may hold conjointly, under the management of the National Agricultural Examination Board appointed by them, an Annual Examination in the Science and Practice of Agriculture, at a convenient centre.

2. Candidates who pass the Examination will receive the National Diploma in Agriculture—the Diploma to be distinguished shortly by the letters "N.D.A."

3. The Examination will be conducted by means of written papers and oral Examinations.

4. In order to be eligible to sit for the Board's Examination in Agriculture, a Candidate must—

(a) Present a certificate from a recognised Agricultural College that his attainments in the subjects of *General Botany, Geology, General Chemistry, Physics and Mechanics*, as attested by class and other examinations, are, in the opinion of the authorities of the College, such as to justify his admission to the Board's Examination; or

(b) Produce evidence that he has passed the 1st B.Sc. or the Intermediate Examination in Science of a British University; or

(c) Present a Senior Certificate obtained at the Local Examinations of the Universities of Oxford or Cambridge, and produce evidence that he has continued his study of science for at least a year, and has obtained a certificate in subject 3 "(a) Elementary Chemistry and Physics, (b) Botany of Group H of the Oxford Higher Local Examination, or in Subjects 1, Elementary Chemistry and Physics, and 4, Botany of Group E of the Cambridge Higher Local Examination; or

(d) Present an Intermediate Leaving Certificate of the Scottish Education Department, and produce evidence that he has continued his studies for at least another year and has obtained the Higher Leaving Certificate in Science (including Chemistry and Botany).

The National Agricultural Examination Board desire to give notice that for the Examination of 1923 all candidates will be required, in addition to presenting college certificates, to produce evidence of possessing a practical knowledge of agriculture obtained by residence on a farm for a period or periods covering a complete year of farming operations.

5. In the case of students who satisfy the Board that they have not had the facilities for obtaining the foregoing certificates, the Board will be prepared to consider evidence of equivalent attainment.

6. Candidates will have the option of taking the whole of the following nine papers at one time, or of sitting for a group of any three, four, or five in one year and the remaining subjects in the next year.

SUBJECT.	Maximum Marks.	Pass Marks.
1. Practical Agriculture (First Paper)	300	180
2. Practical Agriculture (Second Paper)	300	180
3. Farm Machinery and Implements	200	100
4. Land Surveying and Farm Buildings	100	50
5. Agricultural Chemistry	300	150
6. Agricultural Botany	300	150
7. Agricultural Book-keeping	200	100
8. Agricultural Zoology	200	100
9. Veterinary Science	200	100
	<hr/> 2100	<hr/> 1110

NOTE.—Candidates taking the Examination in two Groups of subjects are recommended to take Agricultural Chemistry and Agricultural Botany in the first year.

7. A Candidate who obtains not less than three-fourths (1575) of the aggregate maximum marks (2100) in the entire Examination will receive the Diploma with Honours, provided that he obtains not less than three-fourths (450) of the maximum marks (600) in the two Practical Agriculture papers.

8. Candidates electing in 1922 to take the entire Examination at one time and failing in not more than three subjects may appear for these subjects in the following year. Failure in more than three subjects will be regarded as failure in the whole Examination.

9. In the case of candidates electing in 1922 to take the Examination papers in two groups—

(a) A candidate appearing for a group of *three* subjects and failing in a single subject may appear for that subject in the following year. Failure in more than one subject will be regarded as failure in the group.

(b) A candidate appearing for a group of four, five, or six subjects, and failing in not more than two subjects, may appear for those subjects in the following year. Failure in more than two subjects will be regarded as failure in the group.

10. Non-returnable fees must be paid by Candidates as follows :—

Entire Examination	Six guineas.
Group of Subjects	Three guineas.
Reappearance for any Subjects	10/6 per Subject.

11. The Board reserve the right to postpone, abandon, or in any way, or at any time, modify an Examination, and also to decline at any stage to admit any particular Candidate to the Examination.

The Examination will take place at the Leeds University on THURSDAY, MARCH 30th, 1922, and following days.

Forms of application for permission to sit at the Examination may be obtained from "The Secretary, Royal Agricultural Society of England, 16 Bedford Square, London, W.C. 1," or from "The Secretary, Highland and Agricultural Society of Scotland, 3 George IV. Bridge, Edinburgh," and must be returned duly filled up not later than SATURDAY, FEBRUARY 25th, 1922, when the Entries will close.

16 BEDFORD SQUARE, LONDON, W.C. 1,
December 1921.

SYLLABUS OF SUBJECTS OF EXAMINATION

PRACTICAL AGRICULTURE.

I.—FIRST PAPER.

1. *British Farming*.—Arable, stock-raising, dairying—Approximate areas covered by the different systems—Typical examples of each—Area in Great Britain under chief crops—Numbers of live stock—The recent history of agriculture—Short summary of agricultural returns.

2. *Climate*.—The effect of climate on farming practice—Rainfall—Temperature—Prevailing winds—Weather forecasts.

3. *Soils*.—The influence of geological formations on the systems of farming—Classification of soils—Character and composition—Suitability for cultivation—Reclamation—Drainage—Irrigation—Warping—Application of lime and marl—Bare fallows—Tillage—Subsoiling—Deep and thorough cultivation.

4. *Manures*.—The manures of the farm—The treatment of farmyard manure—The disposal of liquid manure and sewage—General manures—Special manures—Field trials of manures—The application of manures—Period of application and amounts used per acre—Unexhausted value of manures and feeding-stuffs.

5. *Crops*.—Wheat, barley, oats, rye, beans, peas, potatoes, turnips, swedes, mangolds, forage plants, hops, and other crops—Their adaptation to different soils and climates—Varieties—Selection of seed—Judging seeds—Cultivation, weeds and parasitic plants, best methods of prevention and eradication—Harvesting—Storing—Cost of production—Improvement of crops by selection and hybridising—Field trials—Methods which the farmer may adopt—Selection to resist disease—The principles of rotations—Rotations suitable for different soils and climates—Rotations and the maintenance of fertility—Green manuring—Leguminous crops in rotation—Catch crops—The advantages and disadvantages of rotations—Specialised farming—Management of Orchards.

II.—SECOND PAPER.

6. *Live Stock*.—The different breeds of British live stock—Their origin, characteristics, and comparative merits—Suitability for different districts—Breeding—General principles—Selection—Mating—Crossing—Rearing and general management—Breeding and rearing of horses, cattle, sheep, pigs and poultry—Rearing colts and raising store stock—The foods of the farm—Their composition and suitability for different classes of stock—Purchased foods—Composition and special value—Rations for different kinds and ages of stock—Cost of producing beef, mutton, pork, and milk—Cost of feeding farm horses.

7. *The disposal of Crop, Produce, and Stock*.—Marketing grain and other crops—Sale of stock—Live weight—Dead weight.

8. *Milk*.—The production and treatment of milk—The manufacture of cheese, butter, &c.—The utilisation of by-products.

9. *Farming Capital*.—Calculations of the stocking and working of arable, stock, and dairy farms—Farm valuations—Rent and taxes.

10. *Labour*.—Organisation of labour—piece-work, time-work—labour costings.

11. *Renting a Farm*.—Indications of condition, productive power, and stock-carrying capacity—Leases—Conditions of occupancy.

N.B.—It is essential that a Candidate know his subject practically, and that he satisfy the Examiner of his familiarity with farm work and management.

III.—FARM MACHINERY AND IMPLEMENTS.

1. *Power*.—The principle of action, construction, and method of working, also care and management of steam engines and boilers, gas, oil and petrol engines and agricultural tractors—Cost and working expenses in connection with the above—Estimation of the brake horse-power of engines—Power derived from water—Measurement of the quantity of water flowing in a stream—General arrangement of water-power plants—Water-wheels—Turbines—Pumps, principle of action and construction—Flow of water through pipes—Hydraulic Ram—Windmills.

2. *Agricultural Implements and Machinery*.—The mode of action and the general principles involved in the construction and working of farm implements and machinery—Arrangement of machinery with respect to the power plant—Pulleys and belting—Shafting and bearings—Lubrication—Lifting appliances—Strength and care of chains—Concrete and its use in the construction of simple foundations for engines and machines.

3. *Implements of Cultivation*.—Ploughs—Cultivators—Grubbers—Harrows—Drills—Manure Distributors—Seeding and planting implements.

4. *Implements of Harvesting*.—Mowing and Reaping machines—Rakes—Teddies—Elevators—Potato raisers.

5. *Implements of Transit*.—Carts, waggons, rick lifters, tractors.

6. *Threshing and Food-preparing Machinery*.—Threshing machines, stationary and portable, Screen Winnowers—Hummelers, Chaff cutters—Pulpers—Cake breakers.

7. *Dairy Appliances*.—Milking machines—Cream separators—Churns and other butter-working appliances—Milk delivery cans—Cheese-making utensils—Vats and presses.

N.B.—Candidates are expected to have had some experience with agricultural machinery and implements under actual working conditions, and to be capable of illustrating their answers, when necessary, by intelligible sketches or diagrams.

IV.—LAND SURVEYING AND FARM BUILDINGS.

1. The use and adjustment of instruments employed in Surveying and Levelling other than the Theodolite.

2. Land surveying by chain—Plotting from field book, and determination of areas surveyed—The simpler "field problems."

3. Levelling and plotting from field book.

4. A knowledge of the various classes of maps published by the Ordnance Survey Department and their Scales.

5. *Roads and Fences*.—The construction and maintenance of farm roads, fences, and ditches.

6. *Land Drainage*.—Methods of draining; mole and pipe drains; cost of construction and maintenance.

7. *Buildings*.—Buildings required on different classes of farms—Economic arrangement of farm buildings—Materials—Construction—Ventilation—Drainage—Water supply—Dimensions of dairy, stables, cow-sheds, yard, courts, and piggeries—Accommodation for power—Implement, machinery, and cart sheds—Hay and grain sheds—Shelter sheds—Storage of manure.

N.B.—Each Candidate should have with him at the Examination a pair of compasses, scales of equal parts, including a scale of one chain to an inch, and the scale fitting the Ordnance map, $\frac{1}{2500}$ or 25'344 inches to the mile, a small protractor, a set square, and a straight-edge about 18 inches in length.

V.—AGRICULTURAL CHEMISTRY.

1. *The Atmosphere*.—Its composition and relations to plant and animal life.
2. *Water*.—Rain water—Soil water and drainage—Drinking water—Sewage and irrigation.
3. *The Soil*.—Origin, formation, and classification of soils—Sampling—Analysis—Composition of soils—The chemical and physical properties of soils—The water and air of the soil—Biological changes in the soil—The soil in relation to plant growth—Fertility—Causes of infertility—Improvement of soils.
4. *Manures*.—Theories of manuring—Classification of manures—Origin, nature, and characteristics of manures—Manufacture of manures—Composition, analysis, adulteration, and valuation of manures—Farmyard manure and other natural manures—Green-manuring—Liming, marling, claying—Artificial manures, their origin and manufacture—Fertilisers and Feeding Stuffs Act—Sampling of manures.
5. *Poisons, Antiseptics, and Preservatives*.—General chemical composition and character of insecticides, fungicides, antiseptics, and preservatives used on the farm.
6. *Plants and Crops*.—Constituents of plants—Assimilation and nutrition of plants—Sources of the nitrogen and other constituents of plants—Germination—Action of enzymes—Composition and manurial requirements of farm crops—Food products derived from crops—Manuring experiments.
7. *Animals*.—Composition of animal body—Animal nutrition—Digestion—Assimilation, metabolism, respiration, and excretion.
8. *Foods and Feeding*.—Constituents of foods—Origin, nature, and composition of chief feeding-stuffs—Sampling, analysis, and adulteration of foods—Nutritive value and digestibility of food—Functions of chief food constituents—Energy values—Vitamines—Relation of foods to the production of work, meat, milk, and manure—Manurial residues of foods.
9. *Dairy Chemistry*.—The composition of milk, cream, butter, cheese, &c.—Conditions which influence the composition of milk and milk products—Action of ferments and enzymes on milk and milk products—Milk-testing—Analysis and adulteration of dairy products.

N.B.—Candidates are required to bring their Laboratory Notes to the Oral Examination in this subject.

VI.—AGRICULTURAL BOTANY.

In addition to a general knowledge of the morphology, histology, and physiology of plants, candidates will be expected to possess a detailed knowledge of the following subjects:—

British grasses of agricultural importance: recognition of, at any stage of growth. Habitats of important species. Constitution of the grass flora of good meadows and pastures. Composition of seed mixtures for temporary and permanent leys on various soils. The effects of artificial manures on the flora of grass land.

The weeds of arable and grass land. Poisonous and parasitic weeds. Methods of distribution by seed and vegetatively: of eradication. Weeds as soil indicators. Recognition of the seeds of the common weeds, particularly those characteristically found in clover, grass, &c., seed.

The chief varieties of wheat, barley, oats, clovers, roots, and other farm crops: their suitability for various climatic and soil conditions. The identification of the more important types of cereals by means of their grain characters. Characteristics of good and bad samples of cereals.

Identification of materials used in feeding cakes and meals.

Plant-breeding. Principles of heredity in plants. Pure lines. Fluctuating variability. Selection.

Disease in plants. Diseases due to the attacks of parasitic fungi. Resistance to disease : conditions affecting. Fungoid diseases scheduled from time to time by the Ministry of Agriculture and Fisheries.

Yeasts and fermentation.

The general outlines of bacteriology : nitrogen fixation, nitrification, and denitrification. Putrefaction and the bacteriology of milk, butter, and cheese.

VII.—AGRICULTURAL BOOK-KEEPING.

Principles of book-keeping ; single and double entry ; opening books, description of subsidiary books, with examples of entries therein ; the ledger ; posting ; preparation of trial balance ; valuation of stocks and effects ; closing and proving the books, preparation of profit and loss account and balance-sheet ; ruling off accounts.

Application of special methods to farms of varying requirements.

VIII.—AGRICULTURAL ZOOLOGY.

1. The part played by common animals in helping or hindering agricultural operations, as illustrated by moles and voles, insectivorous and other birds, snails and slugs, useful and injurious insects, arachnids and myriapods, earthworms, &c.

2. *General Structure of Insects*, especially the external characters.

3. *Life-history of Insects*.—Economic importance of different stages. A knowledge of the life-history of the principal insect pests as affording a basis for appropriate treatment.

4. *Acarina* injurious to Food Crops and Live Stock.

5. *Parasitic Worms*.—Flukes, Tapeworms, and Threadworms.

6. *Preventive and Remedial measures* in regard to insects, acarines, and worm Parasites—*e.g.*, farm practice in relation to the discouragement of Insect Attack. Encouragement of insect-eating birds and mammals. Artificial remedies. Insecticides. Treatment for Parasites.

N.B.—*Practical acquaintance with common animals, especially insects and worm parasites, will be expected. Where the Candidate is not acquainted with the scientific name of an animal, the generally received English name will be accepted. Candidates are required to bring their Laboratory Notes to the Oral Examination in this subject.*

IX.—VETERINARY SCIENCE.

1. Elementary Anatomy and Physiology of the horse, ox, sheep, and pig.

2. The general principles of breeding—including the physiology of reproduction, the laws of heredity, the periods of gestation, and the signs of pregnancy in the mare, cow, ewe, and sow.

3. Dentition as a means of determining the age of horses, cattle, sheep, and swine.

4. The management of farm stock in health and disease.

The following won the Diploma in 1921 :—

Diploma, with Honours.

WILLIAM RIDDET, West of Scotland Agricultural College, Glasgow.

Diploma.

JOHN ARMOUR, West of Scotland Agricultural College, Glasgow.

PHILIP STANLEY BROWN, Harper-Adams Agricultural College, Newport, Salop.

IAN CAMPBELL, West of Scotland Agricultural College, Glasgow.

EDWARD GORDON CHAPMAN, Midland Agricultural and Dairy College, Sutton Bonington, Loughborough.

WILLIAM FRANK CREAL, South-Eastern Agricultural College, Wye, Kent.

LESLIE ERIC COOK, University College, Reading.

RALPH A. COULTHURST, Midland Agricultural and Dairy College, Sutton Bonington.

WILLIAM LEWIS DAVIES, University College of Wales, Aberystwyth.

ALEXANDER BRUCE DICKSON, West of Scotland Agricultural College, Glasgow.

EDWARD FARQUHARSON, University of Aberdeen.

HERBERT EDWARDES GATTON, South-Eastern Agricultural College, Wye, Kent.

REGINALD J. HAINES, Midland Agricultural and Dairy College, Sutton Bonington.

JOHN SIDNEY KING, Midland Agricultural and Dairy College, Sutton Bonington.

ARTHUR WILLIAM LING, South-Eastern Agricultural College, Wye, Kent.

JOHN WALTER LOWE, Harper-Adams Agricultural College, Newport, Salop.

JOHN M'EVROY, Royal College of Science, Dublin.

ALEXANDER W. M'GOWAN, West of Scotland Agricultural College, Glasgow.

HERBERT MARSLAND, Harris Institute, Preston.

ALEXANDER NELSON, West of Scotland Agricultural College, Glasgow.

ANDREW WILSON PATERSON, West of Scotland Agricultural College, Glasgow.

WILLIAM THOMAS PRICE, University College, Reading.

CLIFFORD WILLIAM ROBERTS, Midland Agricultural and Dairy College, Sutton Bonington.

DOUGLAS HEPWORTH ROBINSON, University College, Reading.

ROBERT M. S. ROUTLEDGE, University of Leeds.

THOMAS ERIC SHADRACK, Harris Institute, Preston.

DENNIS SLATTERY, Royal College of Science, Dublin.

JOHN VIRTUE WHITELAW, West of Scotland Agricultural College, Glasgow.

GEOFFREY M. P. WILLIAMS, Midland Agricultural and Dairy College, Sutton Bonington.

ROBERT CECIL WOOD, University of Leeds.

EXAMINATION PAPERS OF PAST YEARS.

Copies of the Papers set at the Annual Examination for the National Diploma in the Science and Practice of Agriculture held in 1921 may be had upon application. Price 6d. per set.

VETERINARY DEPARTMENT

The Society established a Veterinary Department in 1823, but by an arrangement made with the Royal College of Veterinary Surgeons, the Society's examination ceased in 1881. Holders of the Society's Veterinary Certificate are entitled to become Members of the Royal College of Veterinary Surgeons on payment of certain fees, without being required to undergo any further examination. The number of Students who passed for the Society's Certificate is 1183.

The Society votes annually eleven silver medals for Class Competition to each of the two Veterinary Colleges in Scotland, the one in Edinburgh and the other in Glasgow.

FORESTRY DEPARTMENT

The Society grants **FIRST and SECOND CLASS CERTIFICATES in FORESTRY.**

1. An Examination will be held each alternate year about the month of April.

2. The next Examination will be held at 3 George IV. Bridge, Edinburgh, in the month of March 1923, provided a sufficient number of candidates present themselves for examination.

3. Candidates must possess—1. A thorough acquaintance with the theory and practice of Forestry. 2. A general knowledge of the following branches of study, so far as these apply to Forestry: (a) The Elements of Botany and Forest Zoology; (b) The Elements of Physics, Chemistry, and Meteorology; (c) Forest Engineering, including Land and Timber Measuring and Surveying; Mechanics and Construction, as applied to fencing, draining, bridging, road-making, and saw-mills; and Implements of Forestry; (d) Book-keeping and Accounts.

4. The examinations are open to candidates of any age, may be both written and oral, and will include such practical tests as may from time to time be decided to apply.

5. The maximum number of marks for each subject is 100; Pass marks for First-Class Certificate—Forestry, 75; all other subjects, 60. Pass marks for Second-Class Certificate—Forestry, 60; all other subjects, 50.

6. A Candidate who obtains Pass marks in certain subjects, but fails in others, may come up for these other subjects alone, it being understood that without the special permission of the Society no Candidate will be eligible to enter for more than two subsequent examinations.

7. A Candidate who has obtained the Second-Class Certificate may enter again for the First-Class Certificate.

The list of students who obtained certificates prior to 1899 appears in the 'Transactions,' Fifth Series, vol. xi. (1899).

The following have since obtained First-Class Certificates:—

ERIC ARTHUR NOBBS, Department of Agriculture, Cape Town,	1899
GEORGE POTTS, Grey College, Bloemfontein, Orange River Colony,	1899
DUNCAN S. RABAGLIATI, 1 St Paul's Road, Bradford,	1901
FRANK SCOTT, Dumfries House Mains, Cumnock,	1903
WILLIAM T. STOCKLEY, Rose Villa, Garswood, near Wigan,	1906
A. FRANK WILSON, C.D.A. (Edin.), Reedieleys, Auchtermuchty,	1907
GEORGE FISHER, Farm Brook, Pilling, Garstang, Lancs.,	1909
JOHN PATTEN, jun., Hulne Park, Alnwick,	1909
ALEXANDER MITCHELL, Dalmeny Park, Edinburgh,	1909
JOHN D. DAVIDSON, Brimstage, Birkenhead,	1911
DONALD DOULL, M.A., A.R.C.Sc., High School, Kelso,	1911
JAMES W. MACKAY, Jervaulx Abbey, Middleham, Yorks.,	1915
HARRY WATSON, Darnaway, Forres,	1915
REGINALD WATT HUNTER, 94 St George's Terrace, Newcastle-on-Tyne,	1919
JOHN M'EWEN, Monaghty Forest, by Elgin	1922
ALFRED POPE, Swinsty Hall, Fewston, Harrogate	1922

The following have since obtained Second-Class Certificates:—

WILLIAM BRUCE, B.Sc., East of Scotland College of Agriculture, Edinburgh,	1901
RAJAPPIER SWAMINATHAN, 56 Jesus Lane, Cambridge,	1901
THOMAS USHER, Courthill, Hawick,	1901
ALLAN CARRUTH, Lawmarnock, Kilbarchan,	1905
ALEX. M. LUMSDEN, Newburn Schoolhouse, Upper Largo,	1905
ROBERT M. WILSON, Laws Cottage, Duns,	1905
THOMAS CAMPBELL, Greystoke, Penrith,	1906
DONALD FERGUSON, Quarry Lane, Lennoxtown,	1906
CHARLES PENRHYN ACKERS, Huntly Manor, Gloucester,	1908
ROBERT HOWIE, Beechwood, Arbroath,	1908
JOHN TROTTER, D.Sc., 22 West Savile Terrace, Edinburgh,	1908
JAMES A. S. WATSON, Downieken, Dundee,	1908
NORMAN H. PEARSON, 52 Percy Park, Tynemouth,	1909
LIONEL F. STOBART, Royal Agricultural College, Cirencester,	1911
ALEXANDER GEORGE NORRIE, Cairnhill, by Turriff,	1913
WILLIAM WATT, Darnaway, Forres,	1913
WILLIAM P. GREENFIELD, 6 Littlefield Lane, Grimsby,	1915

SYLLABUS OF EXAMINATION

I.—SCIENCE OF FORESTRY AND PRACTICAL MANAGEMENT OF WOODS.

I. *Principles of Scientific Forestry*.—1. Effects of heat, light, moisture, and air-currents on forest vegetation. 2. Effects of depth, porosity, moisture, and chemical composition of the soil on forest vegetation. 3. Effects of forest vegetation on the soil and air. 4. Rate and extent of development, longevity, and reproductive power of trees. 5. Pure and mixed woods. 6. Systems of sylviculture.

II. *Forest Organisation*.—7. General ideas regarding a regulated system of forest management. 8. Knowledge of working plans of forests.

III. *Practical Management of Woods*.—9. Draining and irrigation. 10. Choice of species for various situations. 11. Seed and sowing, including nurseries. 12. Planting. 13. Natural regeneration by seed, shoots, and suckers. 14. Formation of mixed woods. 15. Tending of young woods. 16. Pruning. 17. Thinning. 18. Sylvicultural characteristics of the principal trees.

IV. *Injuries by Storms and Fires*.—19. Storms. 20. Fires.

V. *Timber*.—21. Its technical properties. 22. Its defects. 23. Recognition of different kinds of timber. 24. Processes for increasing its durability.

VI. *Utilisation of Produce*.—25. Uses of wood and other produce. 26. Felling. 27. Conversion. 28. Seasoning. 29. Transport. 30. Sales. 31. Harvesting of bark.

II.—FOREST BOTANY AND FOREST ZOOLOGY.

(a) FOREST BOTANY.

The fundamental facts of morphology, physiology, and classification of plants. The structure and function of the plant-cell and the plant-tissues. Their primary distribution. The secondary changes they exhibit in consequence of perennation.

The structure and function of the root and shoot in flowering-plants. Buds, their forms and uses. The flower. The fruit. The seed.

The structure and function of vegetative and reproductive organs of fungi.

Relationship of plants to air, soil, and water. Effect of light, heat, and mechanical agencies upon plants. Nutrition. The nature and elements of the food of plants. Sources of plant-food. The absorption, elaboration, transference, and storage of food. Respiration and transpiration. Parasites and saprophytes. Symbiosis.

Growth of plants in length and thickness. Correlation of growth, pruning. Germination of seeds. Formation of wood and bark. Healing of wounds.

Diseases of plants due to faulty nutrition and unfavourable circumstances of growth. Diseases due to attacks of fungi.

Natural reproduction and propagation by seeds and by buds. Fertilisation of flowers. Hybridisation. Artificial propagation by budding, grafting, layering, and cutting.

The characters of the large groups and classes of the vegetable kingdom. The characters of the families of plants which include the chief timber trees. The botanical characteristics of the principal British forest-trees (including the structural features of their wood). The weeds of the forest and their significance.

(b) FOREST ZOOLOGY.

The group Insecta: its position in the animal kingdom. Structure, mode of reproduction, and metamorphosis of insects. The outlines of classification of the group. Conditions favourable to the numerical increase of insects. Natural checks to increase (e.g., birds, mammals, parasitic insects). The identification and life-history of the more important insects injurious to forest trees and fruit trees. The damage caused by these insect pests and their mode of attack. The damage caused by animals. Preventive and remedial measures.

III.—PHYSICS, CHEMISTRY, AND METEOROLOGY.

Physics.

Mass, weight, specific gravity, solid, liquid, and gaseous states of matter. Capillarity, osmose, vapour tension, suction pump, force pump, syphon, barometer, atmospheric pressure. Boyle's law. Levers and pulleys. Heat, measurement of heat, specific heat; transference of heat by conduction, convection, and radiation. Boiling and freezing. Latent heat. The thermometer. The conservation and transformation of energy. Light—reflection, refraction, polarisation; the spectrum. The rudiments of electricity and magnetism.

Chemistry.

Elements. Oxygen, hydrogen, nitrogen,—their preparation, properties, and chief compounds. Acids, bases, salts. Combustion, oxidation, reduction. Sulphur, carbon, phosphorus; and their compounds, with oxygen and hydrogen. Metals—potassium, sodium, calcium, magnesium, aluminium, iron, copper, lead, mercury, and their chief compounds. Carbohydrates, marsh gas, olefiant gas, alcohol, acetic acid, oxalic acid. Distillation of wood and coal.

Meteorology.

The atmosphere, its composition and physical properties. Measurement of pressure and temperature. The barometer. Rain, hail, snow, fog, cloud, dew, the dew-point, hoar frost. The weathering of rocks and soils. Gases injurious to vegetation.

IV.—FOREST ENGINEERING, INCLUDING LAND AND TIMBER MEASURING AND SURVEYING; MECHANICS AND CONSTRUCTION AS APPLIED TO FENCING, BRIDGING, ROAD-MAKING, AND SAW-MILLS.

1. The use of the level and measuring-chain. Measuring and mapping surface areas. 2. The measurement of solid bodies—as timber, stacked bark, fagots, &c., earthwork. 3. The different modes of fencing and enclosing plantations; their relative advantages, durability, cost of construction, and repairs. 4. The setting out and formation of roads for temporary or permanent use. 5. The construction of bridges over streams and gullies; of gates or other entrances. 6. The construction and working of estate saw-mills.

V.—ARITHMETIC—BOOK-KEEPING.

1. Arithmetic—including Practice, Proportion, and Decimal Fractions. 2. Book-keeping—including the description of books to be kept, and the solution of practical questions in Book-keeping and the preparation of Accounts.

EXAMINATION PAPERS, 1922.**PRACTICAL FORESTRY.**

1. In a practically treeless hilly area, the planting of which you are entrusted with, explain the principles which would guide you in arriving at the limit of altitude for profitable tree-growth, considering generally the effect of latitude, aspect, wind, and soil (plantable soil being classed good, fair, and poor). State briefly the advantages of such a classification of soils.

2. Explain the method you would adopt in laying down the boundary line of an extensive plantation, assuming that the area to be planted is of a hilly and exposed nature.

State the type of fence you would recommend for the foregoing area for preventing sheep and ground-game from entering the plantation; and give a specification and an approximate cost per yard of its erection.

3. Compare the respective advantages and disadvantages of Spring and Autumn planting, and indicate under what conditions either season may be preferred.

What are, in your opinion, the most favourable spacing distances at which to plant trees? Choose any four species, and state the planting distances you would select for each, and state your reasons for the spacings you indicate.

4. Describe the kinds of soil and climatic conditions most favourable for the successful cultivation of the following: Oak, Ash, Larch, Douglas Fir, and Norway Spruce.

5. An estate with 2000 acres of timber is to be sold, and you are invited by the vendor to make a valuation of the timber. The timber is composed of 500 acres of mature wood of Oak, Ash, and Larch, 100 years of age; 500 acres of pure Scots Pine, 80 years of age; and 500 acres of pure Scots Pine from 30 to 40 years of age. There are also 500 acres of young plantations under 20 years of age. State how you would proceed to ascertain volume and value of the first three classes, and on what principle you would value the younger plantations. Give prices per cubic foot for the older timber.

6. At what stage in the life of a coniferous plantation should thinning operations be begun? and state the objects and benefits of thinning.

(Three hours allowed.)

FOREST BOTANY AND FOREST ZOOLOGY.**(A) FOREST BOTANY.**

(Four questions only to be attempted.)

1. Describe the buds, flowers, and fruit of Elm, Alder, and Lime.

2. What is the general microscopic structure of the foliage leaf of such a tree as the Beech or Oak? In what essential ways does the

structure differ from that in the leaf of a Pine? Suggest reasons for the differences.

3. Write a life-history of the Fungus which causes "Dry-Rot." Suggest preventive measures.

4. Write a life-history of *Taxus baccata*.

5. Name and give characters for recognition of any three forest weeds known to you. State the harm each does.

(B) FOREST ZOOLOGY.

(Two questions only to be attempted.)

1. Describe by means of diagrams the nature of the brood-galleries of the Pine Beetle (*Myelophilus piniperda*), the Large Ash-Bark Beetle (*Hylesinus crenatus*), the Two-Toothed Pine Beetle (*Pityogenes* or *Tomicus bidentatus*).

2. Describe a Lepidopterous insect harmful to Larch or Pine under the headings :—

- (a) how recognised as adult,
- (b) how recognised as larva,
- (c) the nature of the damage,
- (d) treatment.

3. Name and distinguish four kinds of gall due to insects, and write an account of one of them, from origin to ripe condition.

(Two hours and a half allowed.)

PHYSICS, CHEMISTRY, AND METEOROLOGY.

1. State what is meant by the terms combustion, oxidation, and reduction, distinguishing between the last two. Under which of these heads would you classify the following chemical changes : phosphorus, copper, mercuric oxide, magnesium, heated in air?

2. What type of compound is produced when an element combines with oxygen? Into what groups may the elements be divided according to the properties of these compounds? State the general properties distinguishing the elements of these groups.

3. Name the chief sources of any three of the following metals, and describe the extraction of the metal in any one case : sodium, calcium, iron, aluminium, lead, mercury.

4. Define the boiling-point of a liquid. If the boiling-point of a liquid is observed simultaneously at the foot and on the top of a mountain, state and explain any difference which would be noted.

5. Explain the formation of cloud and rain. What is understood by the "dew-point," and what is the purpose of determining it?

(An hour and a half allowed.)

FOREST ENGINEERING.

1. From the following level-book notes, with a datum line 25 feet below the ground-level at distance 0 :

- (a) Calculate and check the reduced levels.
- (b) Plot the section to a horizontal scale of 100 feet to an inch, and a vertical scale of 10 feet to an inch.
- (c) Indicate the direction of bottom line of drainage pipes, and find the slope of this line.

Rise.	B. S.	I. S.	F. S.	Fall.	Reduced level.	Distance in feet.	Remarks.
	14.54	12.63			25.00	0	B. M. ⊙ A, bottom of drain-pipe is to be 2.05 feet below surface at ⊙ A.
		8.51				90	
	7.65	10.24	14.28			160	
		4.10				240	
		2.89				350	
		8.51				430	
		11.94				540	
			15.19			620	
						700	⊙ B, level of water of pond. Bottom of drain-pipe to be 1 foot above water-level.

2. Draw a rough sketch of a field from the following notes, and find its area in acres, &c.

3. Describe, with the aid of a diagram, how you would proceed to carry out the survey of a thick wood, where all the work must be done from the outside, and only a chain and poles are available.

4. A circular plantation is to be formed containing four acres. How many yards of fencing would be required to enclose it?

5. A ditch is to be 3 feet deep, $4\frac{1}{2}$ feet wide at the top, and $1\frac{1}{2}$ feet wide at the bottom ; it is 120 rods in length, and the cost of excavating the soil is estimated at 6d. per cubic yard. What will be the total cost of the work?

6. How would you obtain the width of a river which is too broad for direct measurement? No instrument, other than a chain, is to be used.

Links.	
⊙ B	
854	
721	
600	
415	182
280	
134	110
⊙ A	

(Two hours allowed.)

ARITHMETIC AND BOOK-KEEPING.

I. ARITHMETIC.

1. Find the simple interest on £7665 for 35 days at 5 per cent.
2. What is the value of a piece of timber 5 feet 3 inches long, 2 feet 4 inches wide, and 1 foot 2 inches thick @ 10s. 6d. per cubic foot?
3. Find by practice the value of 3 cwt., 3 quarters, and 14 lbs. @ 8s. 4d. per ton.
4. A small wood, square in shape, has an area of 5625 square yards. It is to be fenced, and the fence is to be erected at a distance of 2 yards from the wood. How many yards of fencing are required?

II. BOOK-KEEPING.

Woodlands Estate has been recently purchased. A separate set of books is to be kept for each branch of the estate management by its supervisor, in which the details of all the transactions affecting the branch are to be recorded. At the end of the period these will be incorporated in the estate office books. You are in charge of one of the branches of the estate work.

1. State briefly—

- (1) What books you consider necessary properly to record your transactions.
- (2) What classes of accounts you expect it will be necessary to open in the ledger.
- (3) How at any given date you would satisfy yourself of the accuracy of your book-keeping.
- (4) How you would close your books at the end of the year.

Note—The transactions you have to record will be confined to purchases and sales, cash receipts and payments including all expenses incidental to your department, and you will control a bank account.

2. Make the entries for the following transaction in the cash-book and the ledger.

1922.

Jan. 1.	Received from estate office	£150	0	0
" 2.	Paid into bank	120	0	0
" 2.	Ordered on credit from G. Toole, implements valued at	100	0	0
" 2.	Paid for books and stationery in cash	2	0	0
" 3.	Sold to S. Birch on credit 500 Scots pine @ 15s. each			
" 3.	Sold to D. Dick, and received payment, deadwood valued at	10	0	0
" 3.	Bought from F. Timber, young trees on credit	200	0	0
" 4.	Paid hire of horses used in haulage	5	0	0
" 6.	Received from S. Birch to account, and paid into bank	250	0	0
" 6.	Paid G. Toole in full by cheque, less 5 per cent discount	95	0	0
" 7.	Paid wages for week	8	0	0

3. How would you propose to keep trace of all implements purchased or acquired?

(One hour and a half allowed.)

DAIRY DEPARTMENT

EXAMINATION IN THE SCIENCE AND PRACTICE OF DAIRYING

This Examination, instituted in 1897, is conducted by the National Agricultural Examination Board, appointed jointly by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland.

REGULATIONS.

1. The Societies may hold annually in England and in Scotland, under the management of the National Agricultural Examination Board appointed by them, one or more Examinations for the National Diploma in the Science and Practice of Dairying; the Diploma to be distinguished shortly by the letters "N.D.D."

2. The Examinations will be held on dates and at places from time to time appointed and duly announced.

3. A non-returnable fee of *Three Guineas* will be required from each candidate.

4. Forms of Entry for the Examination in England may be obtained from "The Secretary, Royal Agricultural Society of England, 16 Bedford Square, London, W.C.1," and must be returned to him duly filled up, with the entry-fee of £3, 3s., on or before Saturday, August 12, 1922.

5. Forms of Entry for the Examination in Scotland may be obtained from "The Secretary, Highland and Agricultural Society of Scotland, 3 George IV. Bridge, Edinburgh," and must be returned to him duly filled up, with the entry-fee of £3, 3s., on or before Saturday, August 12, 1922.

6. A candidate may enter for the Examination either in England or Scotland, but not in both, and a candidate who has once taken part in an Examination in England cannot enter for an Examination in Scotland, or *vice versa*.

7. As a preliminary to the acceptance of an application for permission to enter for the Examination, a candidate must produce:—

(1) A certificate testifying that he or she has received at least SIX session months instruction (not necessarily continuous) in practical dairy work at an approved Dairy training institution.

(2) Evidence that he or she has spent at least SIX months on an approved Dairy farm (which period must not run concurrently with that referred to in sub-section 1), and that he or she has taken part in the work.

(3) Certificates in a prescribed form, from a recognised institution (or recognised institutions) showing that he or she has attended approved courses in Chemistry, Bacteriology, and Botany, and has satisfied the authorities of the institution of his (or her) fitness for admission to the Examination.

8. In the Examination a candidate will be required to satisfy the Examiners, by means of written papers, practical work, and *viva voce*, that he or she has—

- (1) A general knowledge of the management of a Dairy Farm, including the rearing and feeding of Dairy Stock, the candidate being required to satisfy the Examiners that he or she has had a thorough training and practical experience in all the details of Dairy work as pursued on a farm.
- (2) A thorough acquaintance, both practical and scientific, with everything connected with the management of a Dairy, and the manufacture of Butter and Cheese.
- (3) Practical skill in Dairying, to be tested by the making of Butter and Cheese.

NOTE.—A candidate must be prepared to make any one of the following varieties of Hard-pressed Cheese, the Examiner in Cheesemaking having the option of saying during the Examination what variety a candidate shall make :—

AT THE ENGLISH CENTRE—Cheddar, Cheshire, or Derby.

AT THE SCOTTISH CENTRE—Cheddar, Dunlop, or Cheshire.

- (4) Capacity for imparting instruction to others.

9. The maximum marks obtainable and the marks required for a pass in each subject are as follows :—

	Max.	Pass.
General Dairying Paper	200	120
Cheese-making Paper	200	120
Chemistry and Bacteriology Paper	200	120
Hard Pressed Cheese-making	200	150
Blue Veined Cheese-making	100	75
Soft Cheese-making	100	75
Butter-making	200	150
Capacity for imparting instruction to others	100	50
	<hr/> 1300	<hr/> 860

Honours will be awarded to candidates obtaining an aggregate of 80 per cent (1040) of the maximum marks (1300) in the examination, provided that they also obtain at least 80 per cent (320) of the maximum marks (400) in the General Dairying and Cheese-making Papers.

10. The Board reserve the right to postpone, to abandon, or in any way, or at any time, to modify an Examination, and also to decline at any stage to admit any particular candidate to the Examination.

DATES OF EXAMINATIONS IN 1922.

ENGLAND—FRIDAY, September 8th, and following days, at the University College and British Dairy Institute, Reading; last date for receiving applications, SATURDAY, August 12th.

SCOTLAND—FRIDAY, September 22nd, and following days, at the Dairy School for Scotland, Kilmarnock; last date for receiving applications, SATURDAY, August 12th.

SYLLABUS OF SUBJECTS OF EXAMINATION IN THE SCIENCE AND PRACTICE OF DAIRYING

I.—GENERAL MANAGEMENT OF A DAIRY FARM.

1. *General Management of Pastures and Crops on a Dairy Farm.*
2. *Buildings.*—Situation, Surroundings, Construction, Ventilation, and Drainage of Farm Buildings. Suitability of building materials. Water supply. Construction and arrangement of Dairies: (a) for General Purposes; (b) for Special Purposes.
3. *Foods and Feeding.*—Summer and Winter Feeding of Dairy Cattle. Root crops. Green fodder. Ensilage. Different kinds of food and their composition. Their effect upon Milk, Butter, and Cheese. Special Foods used in Dairy Feeding. Preparation of food for Dairy Stock. Rearing and feeding of young Stock. Feeding and management of Pigs and Poultry.
4. *Dairy Cattle in Health and Disease.*—Characteristics of different Breeds, and choice of Dairy Cattle. General functions of the organs of the animal body. Breeding. Parturition. Organs which secrete milk. Process of milk secretion. Changes which food undergoes during digestion. Diseases of Dairy Cattle and their remedies.

II.—MANAGEMENT OF DAIRY.

1. *Milk and Cream.*—Process of Milking. Dairy Utensils and Appliances, hand and power. Cooling of Milk. Separation and ripening of Cream. Different systems of Cream-raising. Utilisation of Skim-milk. Keeping of Milk. Importance of Cleanliness. Diseases spread by Milk. Conveyance and sale of Milk. Milk records. Keeping of Dairy and Farm Accounts. Creameries. Butter and Cheese Factories. Different systems of Dairying and their comparative returns.
2. *Butter.*—Churns and other Butter-making appliances, hand and power. Souring of Cream. Churning. Washing and working of Butter. Butter-milk. Packing and transmission of Butter. Salting and keeping of Butter. Colouring. Characteristics of good Butter.
3. *Cheese.*—Principles of its manufacture. Making of different kinds of Cheese (from cream, whole-milk, and skim-milk). Acidity of Milk. Use of Rennet and its substitutes. Whey. Appliances for Cheese-making. Ripening and storage of Cheese. Packing and sale of Cheese. Making of Cream and other soft Cheeses.

III.—CHEMISTRY AND BACTERIOLOGY.

[*N.B.*—In this Section there will be expected of the candidate a sound understanding of the scientific principles underlying the practice of Dairying, a knowledge of the composition, nature, properties, and changes undergone by the different substances met with in Dairying, and a general acquaintance with the principles of laboratory methods so far as Dairying is concerned, including the use of the microscope in identifying organisms.]

1. *General Principles of Chemistry.*—The nature of elements and compound bodies. The different forms of matter—solid, liquid, gaseous. Specific gravity, and instruments for determining it. Temperature, and methods of measuring it. Thermometric scales. The influence of temperature in Dairy operations. Physical and chemical changes involved in the following: solution, precipitation, filtration, distillation, oxidation, and reduction. Acids, Bases, Salts—their distinctive properties. Acidity and Alkalinity—their influence and quantitative estimation. Examination and identification of specimens and apparatus.

The Atmosphere—its constituents and impurities; its influence on Dairy operations. Atmospheric pressure.

Water—constituents of pure and natural waters. The impurities of water, and whence derived. The importance of a pure water supply in Dairying.

General knowledge of the elementary chemistry of the following substances and their compounds so far as met with in Dairying: Potash, Soda, Ammonia, Lime, Phosphoric Acid, Alcohol, Acetic Acid, Carbonic Acid, Butyric Acid, Lactic Acid, Albumen, Casein, Fats, Milk-sugar, Glycerine, Pepsin.

Saponification of Fats.

2. *Milk and its Products.*—The nature, composition, properties, and chemical constituents of milk. Microscopical appearances presented by milk. The circumstances that affect the quality and quantity of milk produced by the cow. The influence of feeding. The changes which occur in the keeping of milk, and how produced. The natural and artificial souring of milk. Rennet, its nature and use. Physical and chemical changes involved in the making and keeping of Butter, and in the manufacture and ripening of Cheese. Separated Milk, Condensed Milk, Fermented Milk. The use of Preservatives. Methods of Milk-testing—Mechanical methods, their theory and practice. A general knowledge of the methods employed in the chemical analysis of Milk and Butter. Adulteration of Milk, Cream, Butter, and Cheese—the ways in which adulteration is practised, the changes in composition thereby produced, and a general knowledge of the methods employed in detecting the same.

3. *The Chemistry of Feeding.*—The principal constituents of Food materials, and the functions they severally fulfil. The influence of Food constituents on milk production. Assimilation and Digestion. Animal Heat and Respiration. Milk as a Food. The relation of Food to Manure.

4. *Bacteriology.*—Moulds. Yeasts. Bacteria. The principal kinds of Bacteria met with in Dairying—their forms, methods of reproduction, and conditions of life. The influence of physical agencies upon Bacterial life. Air and Water as carriers of Bacteria. The changes produced by Bacteria in milk and its products. Useful forms and their functions. Harmful forms and their effects—Coagulation, Discoloration, Taints, &c. Pathogenic organisms. The classification of organisms—organised ferments and enzymes. The isolation of Bacteria. Methods of preparation of pure cultures and their practical use. Nutritive media. Soil Bacteriology—Assimilation of Nitrogen by Plants—Nitrification—Denitrification. Pasteurisation and Sterilisation—the practical application of these to Dairy matters. Fermentation and Putrefaction. Disinfectants and Preservatives.

N.B.—*Candidates are required to bring their Laboratory Notes to the Oral Examination in this subject.*

IV.—PRACTICAL SKILL IN DAIRY WORK.

Candidates must be prepared—(1) to produce at or before the Examination a satisfactory certificate of proficiency in the Milking of Cows, signed by a practical Dairy Farmer, and to satisfy the Examiners by a practical test, if so required; (2) to churn and make into Butter a measured quantity of Cream; and (3) to make one Cheese of each of the following varieties: (i) *Hard-pressed, of not less than 30 lb.; (ii) Veined or blue-moulded, of not less than 10 lb.; and (iii) also to make one or other of the following Soft Cheeses: Cambridge, Camembert, Coulommier, or Pont l'Évêque.

* A candidate must be prepared to make any one of the following varieties of Hard-pressed Cheese, the Examiner in Cheesemaking having the option of saying during the Examination what variety a candidate will make:—

AT THE ENGLISH CENTRE—Cheddar, Cheshire, or Derby.

AT THE SCOTTISH CENTRE—Cheddar, Dunlop, or Cheshire.

V.—CAPACITY FOR IMPARTING INSTRUCTION TO OTHERS.

Candidates must also show practically that they are familiar with the management of a Dairy, and are capable of imparting instruction to others.

The following obtained the Diploma in Scotland in 1921:—

Diploma with Honours.

1. WILLIAM RIDDET, Cubeside, Dalry, Ayrshire.
2. SYDNEY R. KIRK, Ardyne, Sandyhills Road, Mount Vernon, Glasgow.

Diploma.

ROSE BAIN, Milltimber Farm, Milltimber, Aberdeenshire.
 WILLIAM GRAHAM BARCLAY, Langbarns, Kirkcudbright.
 ROBERT BRYAN, Orcharton, Cumnock, Ayrshire.
 HELEN EMILY CAMERON, Clunemore House, Drumnadrochit.
 HELEN MARGARET CATHCART, 3 Tipperlinn Road, Edinburgh.
 THOMAS MURRAY CLEMENT, West View, Stranraer.
 VERA COX, Scorrier, Cornwall.
 MARY ELIZABETH CUMMING, Lethendry, Aviemore, Inverness-shire.
 THOMAS DOUGLAS DRYSDALE, 55 Colinton Road, Edinburgh.
 CHRISTIANA M. DUNN, Stonedykes, Bridge of Dee, Aberdeen.
 ELLA PATERSON FRASER, Hill House, Inverness.
 ZOE FREEMAN, Shepperton, Middlesex.
 BRYCE BLAIR GARVEN, Dunblair, Irvine Road, Kilmarnock.
 MARGARET C. GRAHAM, Gallowbury, Stewarton, Ayrshire.
 PATRICIA J. GRIEVE, Drummyellow, by Arbroath.
 DORA HARRISON, 70 Arden Street, Edinburgh.
 ELIZABETH M. HOLMES, 157 Eldon Street, Greenock.
 MARIA A. INGLIS, 4 Gillespie Crescent, Edinburgh.
 MURRAY INGLIS, 15 Denham Green Terrace, Edinburgh.
 HERBERT C. JAMES, Laburnums, Westhoughton, Lancs.
 ZAL R. KOTHAVALA, Ahmedabad, India.
 ALEXANDER LANG, Balronan, Gartocharn, by Alexandria.
 ALEXANDER W. M'GOWAN, 5 Windsor Terrace, Glasgow.
 PENELOPE L. M'LENNAN, Sorrelle Lodge, Benbecula, Inverness.

HERBERT MARSLAND, 30 Canterbury Street, Ashton-under-Lyne.
 HELEN B. PIRIE, Murrayfield, Pittenween, Fife.
 E. WYATT SAMPSON, Corpus Christi College, Cambridge.
 LILLIAS SCOTT, Hillend Gardens, Crossford, Carlisle.
 MARGARET M. STEWART, Lockhill, Ringford, Kirkcudbright.
 JANE L. STRANG, Bedcow, Kirkintilloch.
 JESSIE W. STRANG, Eaglesham, Glasgow.
 MARJORY J. STUART, Lantichan, Nethy Bridge, Inverness.
 JANET M. SWANSON, Philips Mains, Mey, Thurso.
 MARGARET M. R. SWANSON, Philips Mains, Mey, Thurso.
 JOHN N. C. WEIR, Woodilee Farm, Lenzie, Glasgow.

The following obtained the Diploma in England in 1921 :—

Diploma with Honours.

1. HENRY BARRATT PIDDUCK, Midland Agricultural and Dairy College, Kingston, Derby.
2. JOHN HOLMES, University College and British Dairy Institute, Reading.

Diploma.

DORIS BOWES, Lancs. C.C. Dairy School, Hutton, Preston.
 PHYLLIS M. G. CLARKE, British Dairy Institute, Reading.
 AVIS COLNETT, East Anglian Institute, Chelmsford, and British Dairy Institute, Reading.
 MURDOCH C. E. DAHL, Midland Agricultural and Dairy College, and British Dairy Institute.
 MYFANWY DAVIES, British Dairy Institute.
 RUTH DAWSON, British Dairy Institute.
 RUTH M. DILWORTH, Lancs. C.C. Dairy School.
 JOHN KEMP DOUGLAS, British Dairy Institute.
 DOROTHY E. GRANT, British Dairy Institute.
 MARJORIE W. HARTLEY, British Dairy Institute.
 DOROTHY U. HOSKIN, British Dairy Institute.
 JENNIE JONES, British Dairy Institute.
 EVA C. OWEN, University College, Aberystwyth, and British Dairy Institute.
 MAUDE K. PAYNE, Lancs. C.C. Dairy School, and British Dairy Institute.
 CHARLES E. PLATT, The Lindens, Newport, Shropshire.
 WILLIAM T. PRICE, British Dairy Institute.
 KATHLEEN ROSE-INNES, Midland Agricultural and Dairy College.
 ALFRED J. ROWNTREE, British Dairy Institute.
 FLORENCE E. SKELDING, Lancs. C.C. Dairy School.
 THOMAS W. STEER, British Dairy Institute.
 MAY C. THOMAS, British Dairy Institute.
 IDA WELCH, British Dairy Institute.
 MARJORIE J. WHITEHEAD, British Dairy Institute.
 PHYLLIS WILLIAMS-GARDNER, British Dairy Institute.

EXAMINATION PAPERS OF PAST YEARS.

Copies of papers set at past Examinations in Agriculture and in Dairying may be had on application. Price 6d. per set. [N.D.A. Questions of years 1900-4, 1907-8, 1910, 1916-19 are out of print.]

CHEMICAL DEPARTMENT

Chemist to the Society—J. F. TOCHER, D.Sc., F.I.C., Crown Mansions,
41½ Union Street, Aberdeen.

The object of the Chemical Department is to promote the diffusion of a knowledge of Chemistry as applied to agriculture among the members of the Society, to carry out experiments for that purpose, to assist members who are engaged in making local experiments requiring the direction or services of a chemist, to direct members in regard to the use of manures and feeding-stuffs, to assist them to put the purchase of these substances under proper control, and in general to consider all matters coming under the Society's notice in connection with the Chemistry of Agriculture

MEMBERS' PRIVILEGES IN RESPECT TO ANALYSES.

MANURES, FEEDING-STUFFS, SOILS, AND
AGRICULTURAL PRODUCTS.

The fees for analyses made for members of the Society shall, until further notice, be as follows:—

The determination of one ingredient in a single sample of a <i>manure</i> or of a <i>feeding-stuff</i> ,	5s.
The determination of two or more ingredients in a single sample of a <i>manure</i> or of a <i>feeding-stuff</i> ,	10s.

For example—

Linseed and other cakes, for oil or for albuminoids,	} 5s.	
Feeding-meals, ground cereals, for oil or for albuminoids,		
Bone-meals, for nitrogen or for phosphate,		
Compound manures, for nitrogen or for soluble phosphates, or for insoluble phosphates or for potash,		
Superphosphate, for soluble phosphate or for insoluble phosphate,		
Thomas-phosphate powder, for citric soluble phosphate or for total phosphate,	} 10s.	
Linseed and other cakes, for oil and albuminoids, &c.,		
Feeding-meals, ground cereals, for oil, albuminoids, &c.,		
Bone-meals, for nitrogen, phosphate, &c.,		
Compound manures, for nitrogen, soluble phosphates, insoluble phosphates, and potash,		
Superphosphate, for soluble phosphate and insoluble phosphate,		
Thomas-phosphate powder, for citric soluble phosphate and total phosphate,	} £0 5 0	
Limestone, giving the percentage of lime,		1 0 0
Limestone, complete analysis,		0 5 0
Lime, including ground lime, percentage of alkaline lime, " " " complete analysis,		1 3 0
Analysis of soil, to determine fertility and recommenda- tion of manurial treatment,		1 10 0
Complete analysis of soil,		2 10 0
Analysis of agricultural products—hay, grain, ensilage, roots, &c.,		1 0 0

These charges apply only to analyses made for agricultural purposes, and for the sole and private use of members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

Valuations of manures, according to the Society's scale of units, will be supplied if requested.

DAIRY PRODUCE.

Milk, full analysis,	£0 10 0
" solids and fat,	0 5 0
" fat only,	0 2 6
Butter, full analysis,	0 10 0
" partial analysis (water and fat),	0 5 0
Cheese,	0 10 0

WATER.

Analysis of water ¹ to determine purity and fitness for domestic use (the Committee reserve power to refuse from one member more than two samples annually at the reduced fee).....at the reduced fee of	1 0 0
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MISCELLANEOUS.

Search for poisons in food or viscera,	2 0 0
Sulphate of copper, percentage of copper and purity,	0 5 0
" " complete analysis,	0 10 0
Arsenic, carbolic acid and tar acids, and other poisons used in making sheep dips, insecticides, &c.,	5s. to £1

Samples should be sent (carriage paid) to Dr J. F. Tocher, Crown Mansions, 41½ Union Street, Aberdeen.

Note to Members sending Samples for Analysis.

The Directors are anxious to take any steps in their power to expose the vendors of inferior fertilisers and feeding-stuffs, and the members can give them assistance in this by supplying to the chemist, when sending samples for analyses, information as to the guarantee, if any, on which the goods were sold, and also as to the price charged.

INSTRUCTIONS FOR SELECTING SAMPLES FOR ANALYSIS.

MANURES.

Any method of sampling mutually agreed upon between buyer and seller may be adopted, but the following method is recommended as a very complete and satisfactory one: Four or more bags should be selected for sampling. Each bag is to be emptied out separately on a clean floor, worked through with the spade, and one spadeful taken out and set aside. The four or more spadefuls thus set aside are to be mixed together until a uniform mixture is obtained. Of this mixture one spadeful is to be taken, spread on paper, and still more thoroughly mixed, any lumps which it may contain being broken down with the hand. Of this mixture two samples of about half a pound each should be taken by the purchaser or his agent, in the presence of the seller or his agent or two witnesses (due notice having been given to the seller of the time and place of sampling), and these samples should be taken as quickly as possible, and put into bottles or tin cases to prevent loss of moisture, and having been labelled, should be sealed by the samplers—one or more samples to be retained by the purchaser, and one to be sent to the chemist for analysis.

¹ Cases containing bottles for water samples and instructions for sampling are sent from the laboratory on application.

FEEDING-STUFFS.

Samples of feeding-stuffs which are in the form of meal may be taken in a similar manner.

Samples of cake should be taken by selecting four or more cakes from the bulk. These should be nuted to a size not larger than walnuts. The nuted cake should then be thoroughly mixed and samples of not less than one pound each taken from it. The samples should be put into bottles or tins, sealed up, and labelled. One sample should be sent to the analyst, and one or more duplicates retained by the purchaser.

SOILS.

Dig a little trench about two feet deep, exposing the soil and subsoil. Cut from the side of this trench vertical scrapings of the soil down to the top of the subsoil. Catch these on a clean board, and collect in this manner two pounds of soil taken from the whole surface of the section. Similar scrapings of subsoil immediately below should be taken and preserved separately. Five or six similarly drawn samples at least should be taken from different parts of the field, and kept separate while being sent to the chemist, that he may examine them individually before mixing in the laboratory.

VEGETABLE PRODUCTS.

Turnips, &c., at least 50 bulbs carefully selected as of fair average growth.

Hay, straw, ensilage, &c., should be sampled from a thin section cut across the whole stack or silo, and carefully mixed; above 2 lb. weight is required for analysis.

Grain should be sampled like manures.

DAIRY PRODUCE.

Milk.—Samples of milk from individual cows should be taken direct from the milk-pail after complete milking. Average samples from a number of cows should be taken immediately after milking. Specify whether the sample is morning or evening milk, or a mixture of these. Samples to be tested for adulteration should not be drawn from the bottom or taken from the top of standing milk, but they should be ladled from the vessel after the milk has been thoroughly mixed. Samples of milk should be sent immediately to the analyst.

For most purposes a half-pint bottle of milk is a large enough sample.

Butter and Cheese.—About quarter-pound samples are required.

WATERS.

When the water is from a well, it should be pumped for some minutes before taking the sample.

If the well has been standing unused for a long time, it should be pumped for some hours, so that the water may be renewed as far as possible.

If the well has been newly dug or cleaned out, it should be pumped as dry as possible, daily, for a week before taking the sample.

Water from cisterns, tanks, ponds, &c., should be sampled by immersing the bottle entirely under the water, and holding it, neck upwards, some inches below the surface. *Water from the surface should not be allowed to enter the bottle.*

Spring or stream water should not be sampled in very wet weather, but when the water is in ordinary condition. Such waters should be sampled by immersing the bottle, if possible; but if not deep enough for that purpose, a perfectly clean cup should be used for transferring the water to the bottle.

When the bottle has been filled the stopper should be rinsed in the water before replacing it.

Interference with or disturbance of wells or springs, or the ground in their immediate vicinity, must be carefully avoided during sampling, and for at least twenty-four hours before it.

After a sample has been taken, it should be sent to the laboratory as speedily as possible.

A description of the source and circumstances of the water should accompany the sample, as the interpretation of the analytical results depends to some extent on a knowledge of such particulars.

N.B.—Stone jars and old wine bottles are unsuitable for conveying samples. Winchester quarts chemically cleaned should be obtained from the laboratory, Crown Mansions, 41½ Union Street, Aberdeen.

LOCAL ANALYTICAL ASSOCIATIONS.

With the view of encouraging, as well as regulating the conduct of, Local Analytical Associations, the Society, from 1881 to 1893, contributed from its funds towards their expenses a sum not exceeding £250 annually. In view of the passing of the Fertilisers and Feeding Stuffs Act, 1893, it was decided, at a meeting of the Directors on the 6th of December 1893, to discontinue that grant after the 1st of March 1894.

COMPOSITION AND CHARACTERISTICS OF MANURES AND FEEDING-STUFFS.

(See '*Transactions, Fifth Series, vol. 21. 1899.*')

FORMS OF GUARANTEE

GUARANTEE OF MANURE.

I guarantee that the manure called.....and sold by me to
.....contains a minimum of—

Soluble phosphoric acid = Phosphate of lime dissolved.....per cent.
Insoluble phosphoric acid = Phosphate of lime undissolved.....per cent.
Potash salts . . . = Potash (K_2O) . . . per cent.
Total nitrogen . . . = Ammonia . . . per cent.

Signature of seller.....

Date.....19...

GUARANTEE OF FEEDING-STUFF.

I guarantee that the feeding-stuff called.....and sold by me to
.....contains a minimum of—

..... per cent albuminoids.
..... per cent oil.
..... per cent carbohydrates.

Signature of seller.....

Date.....19...

PRICES OF FERTILISERS AND FEEDING STUFFS FOR SEASON 1922.

(Cash Prices as fixed on 1st February. These prices are subject to variation from month to month or oftener).

SUPERPHOSPHATES.

ITEM TO BE VALUED.	PRICES PER UNIT FOR THE UNDERNOTED PERCENTAGES.		
	30 per cent.	35 per cent.	38 per cent
PHOSPHATES DISSOLVED.			
February-March Price	£4 2 6	£4 15 0	£5 2 6
Price per Unit.	2/1	2/8½	2/8½

N.B.—These units are based on the RETAIL CASH PRICES OF MANURES at Leith and Glasgow. When these units are multiplied by the percentages in the analysis of a Manure, they will produce a value representing very nearly the cash price per ton at which TWO TONS may be bought in fine sownable condition at Leith or Glasgow. Larger purchases may be made on more favourable terms.

FERTILISERS.

(Other than Superphosphates.)

Name of Fertiliser.	Guarantee.	Price per Ton.	Price per Unit.
Sulphate of Ammonia*	20·8 % Nitrogen	£ s. d. 1 10 0	£ s. d. 0 14 10½
" " "† neutral*	21·2 % Nitrogen	16 0 0	0 15 4½
" " " "†		16 13 0	0 15 6½
Basic Slag (Thomas Phosphate Powder)*	18 % Total Phosphate	17 3 0	0 16 2½
" " " "†	20 % " " "	2 14 0	0 8 0
" " " "†	22 % " " "	3 0 0	0 3 0
" " " "†	28 % " " "	3 5 0	0 2 11½
Bone Meal, Home	4 Nit 45 % "	4 2 0	0 2 11½
" Indian	4 " 45 / "	9 0 0	P 0 2 0½
Steamed Bone Flour	1 " 60 % "	9 5 0	N 0 13 0½
Seychelles Guano	½ " 61 / "	8 10 0	P 0 2 7½
Ground Mineral Phosphate	60 %	8 2 6	N 0 13 0
" " " "	65 %		P 0 2 6½
" " " "	75 %		0 1 6½
Nitrate of Soda "	15·5 % Nitrogen	4 12 6	0 1 8
" Lime	18·0 % "	14 15 0	0 19 0½
Potash Salt ‡	30·0 % Potash	14 0 0	0 1 6½
" " " "	20·0 % "	6 12 6	0 4 5
Kainit (French)	14·0 % "	4 7 6	0 4 4½
Muriate of Potash ‡	51·0 % "	3 7 6	0 4 0½
Kainit (German) "	12·5 % "	12 5 0	0 4 9½
" (at Aberdeen)	12·5 % "	3 7 6	0 5 4½
Sulphate of Potash ‡	49·0 % "	3 0 0	0 4 9½
		15 0 0	0 6 1½

The prices for all fertilisers are cash prices for two-ton lots at Leith or Glasgow, unless otherwise stated.

* Carriage paid to any Railway Station in four-ton lots.
‡ French (Alsatian) or German (Stassfurt).

† March to May price.

FEEDING STUFFS.

Name of Feeding Stuff.	Price per Ton.	Name of Feeding Stuff.	Price per Ton.
	£ s. d.		£ s. d.
Linseed Cake (Home)	15 10 0	Bran (Medium Offals)	9 15 0
Cotton Seed Cake, White (Bombay)	8 10 0	Parings (Fine Offals)	10 10 0
Cotton Seed Cake (Egyptian)	10 0 0	Dried Brewers' Grains	8 10 0
Decorticated Ground Nut Cake	14 10 0	Dried Distillery Grains	9 10 0
Semi-decorticated Ground Nut Cake	13 10 0	Feeding Treacle	7 10 0
Undecorticated Ground Nut Cake	11 0 0	Locust Beans	7 0 0
Palm Kernel Cake	9 10 0	Maize (Flat American)	8 0 0
Cocoa Nut Cake (Home)	12 10 0	Maize (Round Plate)	9 0 0
Extracted Soya Bean Meal	14 10 0	Beans (Imported China)	12 10 0
Decorticated Cotton Seed Meal	15 0 0	Home Oats	9 0 0
Decorticated Cotton Cake	15 0 0	White Fish Meal	15 0 0
Rice Bran	7 15 0		

CLASSIFICATION OF MANURES.

BONE MEAL	{	Genuine Bone Meal contains from 48 per cent to 55 per cent Phosphates, and from 2.75 per cent to 4 per cent Nitrogen. If phosphates are low nitrogen will be high, and conversely. If Bone Meal is so finely ground that 90 per cent or over passes a sieve of $\frac{1}{16}$ -inch mesh, an addition of 2/6 per ton should be made to the Valuation.
STEAMED BONE FLOUR	{	Ground to a fine powder, and containing about 60 to 65 per cent Phosphates and about 1 to 1½ per cent Nitrogen.
BASIC SLAG (THOMAS PHOSPHATE POWDER) GROUND MINERAL PHOSPHATE	{	Fineness of grinding is of importance. The coarsest kind used should be so finely ground that at least 80 per cent passes through a wire sieve of about 9600 holes per square inch.

INSTRUCTIONS FOR VALUING MANURES.

The unit used for the valuation of manures is the hundredth part of a ton, and as the results of analyses of manures are expressed in parts per hundred, the percentage of any ingredient of a manure when multiplied by the price of the unit of that ingredient represents the value of the quantity of it contained in a ton.

As an example take muriate of potash; a good sample (see p. 38) will be guaranteed to contain 51 per cent of oxide of potash. All potash manures are valued according to the amount of potash (oxide of potash) they yield, and muriate of potash yields 51 per cent potash (K_2O)—i.e., 51 units per ton; and as a ton of muriate of potash costs £12, 5s., the price of the unit is the fifty-first part of that—viz., 4/9.7. If on analysis a sample of muriate of potash guaranteed to contain 51 per cent of potash is found to contain only 50 per cent, the price per ton will be 4/9.7 less—viz., £12, 0s. 2d. to the nearest penny.

Similarly with all other manures, the price per unit is derived from the price per ton of a sample of good material up to its guarantee, and therefore the proper price per ton of a manure is found by multiplying

the price of the unit of the valuable ingredient by the percentage as found by analysis. If a manure contains more than one valuable ingredient, the unit value of each ingredient is multiplied by its percentage, and the values so found when added together give approximately the price per ton of the manure.

Nitrate of soda contains no ammonia, but it contains nitrogen, and 14 units of nitrogen are equivalent to 17 units of ammonia.

The commercial values of manures are determined by means of the UNITS in the following manner :—

Take the results of analysis of the manure, and look for the following substances :—

Phosphates dissolved (or soluble phosphate)	No other items but these
Phosphates undissolved (or insoluble phosphate)	are to be valued, except
Total phosphates	in the case of slag, where
Nitrogen	citric soluble phosphate
Potash	may be valued.

Should the results of analysis or the guarantee not be expressed in that way, the chemist or the seller should be asked to state the quantities in these terms.

Suppose the manure is slag—

The proportion of phosphate present in many slags at the present time is 22 per cent. The price per unit of phosphate in slag is $2/11\frac{1}{2}$. The value of slag containing 22 per cent phosphate is therefore 22 times $2/11\frac{1}{2}$, equal to £3, 5s. per ton.

Suppose the manure is a superphosphate—say an ordinary superphosphate with 30 per cent soluble phosphate,—the price per unit of phosphate in superphosphate is $2/9$. It is valued thus :—

Soluble phosphate. 30 times $2/9$, equal to, say, £4, 2s. 6d.

Insoluble phosphate is not valued in a superphosphate.

Notes.—The units have reference solely to the MARKET PRICES of Manures, and not to their AGRICULTURAL VALUES.

TABLE OF COMPENSATION VALUES FOR 1922.

TABLE SHOWING THE VALUE OF FEEDING-STUFFS AS MANURE PER TON, AND THE COMPENSATION VALUE PER TON OF FOOD CONSUMED, BASED ON THE AVERAGE UNIT PRICES OF FERTILISERS FOR 1922.

The following is a Table showing (under Section A) the average proportions of digested nitrogen, undigested nitrogen, phosphoric acid, and potash present in the feeding-stuffs named. The Table also shows the value per unit of nitrogen (digested and undigested), phosphoric acid, and potash, the prices per unit being the average value per unit prevailing for 1922. Under Section B of the Table is shown the compensation value per ton of food consumed for each of the feeding-stuffs named, based on the unit prices for 1922. Column (1) of Section B of the Table shows the value per ton recovered in dung; Col. (2) of the same section shows the value of the lasting part of dung per ton; while the remaining three columns show the residual values per ton after one crop, two crops, and three crops have been removed.

Foods.	VALUATION PER					
	Digested Nitrogen.			Undigested Nitrogen.		
	Per cent in food.	Value at 15s. per unit.	Two-fifths value to manure.	Per cent in food.	Value at 10s. per unit.	Three-fourths value to manure.
		s. d.	s. d.		s. d.	s. d.
Cotton-cake, decorticated	5.92	88 10	35 6	0.98	9 10	7 5
Cotton-cake, undecorticated	2.73	40 11	16 4	0.81	8 1	6 1
Linseed cake	4.08	61 2	24 6	0.67	6 8	5 0
Linseed	3.28	49 2	19 8	0.32	3 2	2 5
Soya-bean cake	6.10	91 6	36 7	0.75	7 6	5 8
Palm-nut cake	1.88	28 2	11 3	0.62	6 2	4 8
Cocoa-nut cake	2.65	39 9	15 11	0.75	7 6	5 8
Earth-nut cake	6.86	102 11	41 2	0.76	7 7	5 8
Rape-cake	3.97	59 7	23 10	0.93	9 4	7 0
Beans	3.43	52 2	20 10	0.52	5 2	3 11
Peas	3.10	46 6	18 7	0.50	5 0	3 9
Wheat	1.49	22 4	8 11	0.31	3 1	2 4
Barley	1.16	17 5	7 0	0.49	4 11	3 8
Oats	1.52	22 10	9 2	0.48	4 10	3 8
Maize	1.22	18 4	7 4	0.48	4 10	3 8
Rice-meal	1.08	16 2	6 6	0.82	8 2	6 2
Locust beans	0.82	12 4	4 11	0.38	3 10	2 11
Malt	1.34	20 1	8 0	0.36	3 7	2 8
Malt culms	3.12	46 10	18 9	0.78	7 10	5 11
Bran	1.98	29 8	11 10	0.52	5 2	3 11
Brewers' and distillers' grains (dried)	2.34	35 1	14 0	0.96	9 7	7 2
Brewers' and distillers' grains (wet)	0.59	8 10	3 6	0.22	2 2	1 8
Dried distillery dra.	3.45	51 9	20 8	1.86	18 7	13 11
Clover hay	1.21	18 2	7 3	1.03	10 4	7 9
Meadow hay	0.88	13 2	5 3	0.62	6 2	4 8
Wheat straw	0.02	0 4	0 2	0.43	4 4	3 3
Barley straw	0.10	1 6	0 7	0.30	3 0	2 3
Oat straw	0.17	2 7	1 0	0.33	3 4	2 6
Mangolds	0.15	2 3	0 11	0.07	0 8	0 6
Swedes	0.16	2 5	1 0	0.09	0 11	0 8
Turnips	0.13	1 11	0 9	0.05	0 6	0 5
Fish-meal	8.08	121 2	43 6	0.90	9 0	6 9

A.						B.								
TON AS MANURE.						COMPENSATION VALUE PER TON OF FOOD CONSUMED.								
Phosphoric Acid.			Potash.			(1) Value re- covered in dung.	(2) Value of lasting part of dung.	Residual Value after.			(3) One crop.	(4) Two crops.	(5) Three crops.	
Per cent in food	Value at 6s. per unit.	Three- fourths value to manure.	Per cent in food.	Value at 4s. 6d. per unit.	Three- fourths value to manure.			s. d.	s. d.	s. d.				s. d.
3.10	18 7	13 11	2.00	9 6	7 2	64 0	28 6	14 3	7 2	3 7				
2.00	12 0	9 0	2.00	9 6	7 2	38 7	22 3	11 2	5 7	2 9				
2.00	12 0	9 0	1.40	6 8	5 0	43 6	19 0	9 6	4 9	2 5				
1.54	9 3	6 11	1.37	6 6	4 11	33 11	14 3	7 2	3 7	1 9				
1.30	7 10	5 11	2.20	10 5	7 10	56 0	19 5	9 9	4 10	2 5				
1.20	7 2	5 5	0.50	2 5	1 10	23 2	11 11	6 0	3 0	1 6				
1.40	8 5	6 4	2.00	9 6	7 2	35 1	19 2	9 7	4 10	2 5				
2.00	12 0	9 0	1.50	7 2	5 5	61 3	20 1	10 1	5 0	2 6				
2.50	15 0	11 3	1.50	7 2	5 5	47 6	23 8	10	5 11	3 0				
1.10	6 7	4 11	1.30	6 2	4 8	34 4	13 6	6 9	3 5	1 8				
0.85	5 1	3 10	0.96	4 7	3 5	29 7	11 0	5 6	2 9	1 5				
0.85	5 1	3 10	0.53	2 6	1 11	17 0	8 1	4 1	2 0	1 0				
0.75	4 6	3 5	0.55	2 7	1 11	16 0	9 0	4 6	2 3	1 2				
0.60	3 7	2 8	0.50	2 5	1 10	17 4	8 2	4 1	2 1	1 0				
0.60	3 7	2 8	0.37	1 9	1 4	15 0	7 8	3 10	1 11	1 0				
0.60	3 7	2 8	0.37	1 9	1 4	16 8	10 2	5 1	2 7	1 3				
0.80	4 10	3 8	0.80	3 10	2 11	14 5	9 6	4 9	2 5	1 2				
0.80	4 10	3 8	0.60	2 10	2 2	16 6	8 6	4 3	2 2	1 1				
2.00	12 0	9 0	2.00	9 6	7 2	40 10	22 1	11 1	5 6	2 9				
3.60	21 7	16 2	1.45	6 11	5 2	37 1	25 3	12 8	6 4	3 2				
1.61	9 8	7 3	0.20	0 11	0 8	29 1	15 1	7 7	3 9	1 11				
0.42	2 6	1 11	0.05	0 3	0 2	7 3	3 9	1 11	0 11	0 6				
0.44	2 8	2 0	0.22	1 1	0 10	37 5	16 9	8 5	4 2	2 1				
0.57	3 5	2 7	1.50	7 2	5 5	23 0	15 9	7 11	3 11	2 0				
0.40	2 5	1 10	1.60	7 7	5 8	17 5	12 2	6 1	3 1	1 6				
0.24	1 5	1 1	0.80	3 10	2 11	7 5	7 3	3 8	1 10	0 11				
0.18	1 1	0 10	1.00	4 9	3 7	7 3	6 8	3 4	1 8	0 10				
0.24	1 5	1 1	1.00	4 9	3 7	8 2	7 2	3 7	1 10	0 11				
0.07	0 5	0 4	0.40	1 11	1 5	3 2	2 3	1 2	0 7	0 3				
0.06	0 4	0 3	0.22	1 1	0 10	2 6	1 9	0 11	0 5	0 3				
0.05	0 4	0 3	0.30	1 5	1 1	2 6	1 9	0 11	0 5	0 3				
7.24	43 5	32 7	0.50	2 5	1 10	89 8	41 2	20 7	10 4	5 2				

BOTANICAL DEPARTMENT

Consulting Botanist to the Society—A. N. M'ALPINE,
6 Blythswood Square, Glasgow.

The Society have fixed the following rates of charge for the examination of plants and seeds for the *bona fide* and individual use and information of members of the Society (not being seedsmen), who are particularly requested, when applying to the Consulting Botanist, to mention the kind of examination they require, and to quote its number in the subjoined schedule. The charge for examination must be paid at the time of application, and the carriage of all parcels must be prepaid.

Scale of Charges.

1. A report on the purity, amount, and nature of foreign materials, and the germinating power of a sample of seed, 1s.
Determination of the species of any weed or other plant, or of any vegetable parasite, with a report on its habits and the means for its extermination or prevention, 1s.
3. Report on any disease affecting farm crops, 1s.
4. Determination of the species of any natural grass or fodder plant, with a report on its habits and pasture or feeding value, 1s.

The Consulting Botanist's Reports are furnished to enable members—purchasers of seeds and corn for agricultural or horticultural purposes—to test the value of what they buy, and are not to be used or made available for advertising or trade purposes by seedsmen or otherwise.

Purchase of Seeds.

The purchaser should obtain from the vendor, by invoice or other writing, the proper designation of the seed he buys, with a guarantee of the percentage of purity and germination, and of its freedom from ergot, and in the case of clover, from the seeds of dodder or broom-rape.

It is strongly recommended that the purchase of *prepared mixtures* of seeds should be avoided. The different seeds should be purchased separately and mixed by the farmer: mixtures cannot be tested for germination.

The Sampling of Seeds.

The utmost care should be taken to secure a fair and honest sample. This should be drawn from the bulk delivered to the purchaser, and not from the sample sent by the vendor.

When legal evidence is required, the sample should be taken from the bulk, and placed in a sealed bag in the presence of a witness. Care

should be taken that the sample and bulk be not tampered with after delivery, or mixed or brought in contact with any other sample or bulk.

At least one ounce of grass and other small seeds should be sent, and two ounces of cereals and the larger seeds. When the bulk is obviously impure the sample should be at least double the amount specified. Grass seeds should be sent at least four weeks, and seeds of clover and cereals two weeks, before they are to be used.

The exact name under which the sample has been sold and purchased should accompany it.

Reporting the Results.

The Report will be made on a schedule in which the nature and amount of impurities will be stated, and the number of days each sample has been under test, with the percentage of the seeds which have germinated.

"Hard" clover seeds, though not germinating within the time stated, will be considered good seeds, and their percentage separately stated.

The impurities in the sample, including the chaff of the species tested, will be specified in the schedule, and only the percentage of the pure seed of that species will be reported upon; but the REAL VALUE of the sample will be stated. The Real Value is the combined percentages of purity and germination, and is obtained by multiplying these percentages and dividing by 100: thus in a sample of Meadow Fescue having 88 per cent purity and 95 per cent germination, 88 multiplied by 95 gives 8360, and this divided by 100 gives 83·6, the Real Value.

Selecting Specimens of Plants.

The whole plant should be taken up and the earth shaken from the roots. If possible the plants must be in flower or fruit. They should be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. They should be placed in a bottle, or packed in tinfoil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

Parcels or letters containing seeds or plants for examination (carriage or postage paid) must be addressed to Professor M'Alpine, Botanical Laboratory, 6 Blythswood Square, Glasgow.

NOTE.—*Members are reminded that seeds may now be tested at the Board of Agriculture for Scotland Seed-testing Station. Samples should be addressed, "The Secretary, Board of Agriculture for Scotland, SEED-TESTING STATION, York Buildings, Edinburgh."*

ENTOMOLOGICAL DEPARTMENT

Consulting Entomologist to the Society—Dr R. STEWART MACDOUGALL,
9 Dryden Place, Edinburgh.

Arrangements have been made with Mr R. Stewart MacDougall, M.A., D.Sc., Edinburgh, to advise members of the Society regarding insects or allied animals which, in any stage of their development, infest—

- | | |
|-----------------------------------|-------------------------------------|
| (a) Farm crops. | (d) Fruit and fruit trees. |
| (b) Stored grain. | (e) Forest trees and stored timber. |
| (c) Garden and greenhouse plants. | (f) Live stock (including poultry). |

Members consulting Dr MacDougall will please forward with their queries examples of the injured plants, or the injured parts of plants, &c., as well as specimens of the insects or other animals believed to be the cause of the injury.

Specimens should be sent in tin or wooden boxes, or in quills, to prevent injury in transmission.

Address letters and parcels (carriage or postage paid) to Dr R. Stewart MacDougall, 9 Dryden Place, Edinburgh.

The Directors have fixed the fee payable by members to Dr MacDougall at 1s. for each case upon which he is consulted : this fee must be sent to him along with the application for information.

PREMIUMS

GENERAL REGULATIONS FOR COMPETITORS.

1. It is to be distinctly understood that the Society is not responsible for the views, statements, or opinions of any of the writers whose papers are published in the 'Transactions.'

2. All reports must be legibly written, and on one side of the paper only; they must specify the number and subject of the Premium for which they are in competition; they must bear a distinguishing motto, and be accompanied by a sealed letter, similarly marked, containing the name and address of the reporter—initials must not be used.

3. No sealed letter, unless belonging to a report found entitled to the Premium offered, or a portion of it, will be opened without the author's consent.

4. Reports for which a Premium, or a portion of a Premium, has been awarded, become the property of the Society, and cannot be published in whole or in part, nor circulated in any manner, without the consent of the Directors. All other papers will be returned to the authors if applied for within twelve months.

5. The Society is not bound to award the whole or any part of a Premium.

6. All reports must be of a practical character, containing the results of the writer's own observation or experiment, and the special conditions attached to each Premium must be strictly fulfilled. General essays, and papers compiled from books, will not be rewarded or accepted. Weights and measurements must be indicated by the imperial standards.

7. The Directors, before or after awarding a Premium, shall have power to require the writer of any report to verify the statements made in it.

8. The decisions of the Board of Directors are final and conclusive as to all matters relating to Premiums, whether for Reports or at General or District Shows; and it shall not be competent to raise any question or appeal touching such decisions before any other tribunal.

9. The Directors will welcome papers from any Contributor on any suitable subject, whether included in the Premium List or not; and if the topic and the treatment of it are both approved, the writer may be remunerated and his paper published.

CLASS I. REPORTS.

SECTION 1.—THE SCIENCE AND PRACTICE OF AGRICULTURE.

FOR APPROVED REPORTS.

1. On any useful practice in Rural Economy adopted in other countries, and susceptible of being introduced with advantage into Scotland—The Gold Medal. To be lodged by 1st November in any year.

The purpose chiefly contemplated by the offer of this premium is to induce travellers to notice and record such particular practices as may seem calculated to benefit Scotland. The Report to be founded on personal observation.

2. Approved Reports on other suitable subjects. To be lodged by 1st November in any year.

SECTION 2.—ESTATE IMPROVEMENTS.

FOR APPROVED REPORTS.

1. By the Proprietor in Scotland who shall have executed the most judicious, successful, and extensive Improvement—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

Should the successful Report be written for the Proprietor by his resident factor or farm manager, a Minor Gold Medal will be awarded to the writer in addition to the Gold Medal to the Proprietor.

The merits of the Report will not be determined so much by the mere extent of the improvements, as by their character and relation to the size of the property. The improvements may comprise reclaiming, draining, enclosing, planting, road-making, building, and all other operations proper to landed estates. The period within which the operations may have been conducted is not limited, except that it must not exceed the term of the Reporter's proprietorship.

2. By the Proprietor or Tenant in Scotland who shall have reclaimed within the ten preceding years not less than forty acres of Waste Land—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

3. By the Tenant in Scotland who shall have reclaimed within the ten preceding years not less than twenty acres of Waste Land—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

4. By the Tenant in Scotland who shall have reclaimed not less than ten acres within a similar period—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November in any year.

The Reports in competition for Nos. 2, 3, and 4 may comprehend such general observations on the improvement of waste lands as the writer's

experience may lead him to make, but must refer especially to the lands reclaimed—to the nature of the soil—the previous state and probable value of the subject—the obstacles opposed to its improvement—the details of the various operations—the mode of cultivation adopted—and the produce and value of the crops produced. As the required extent cannot be made up of different patches of land, the improvement must have relation to one subject; it must be of profitable character, and a rotation of crops must have been concluded before the date of the Report. *A detailed statement of the expenditure and return and a certified measurement of the ground are requisite.*

5. By the Proprietor or Tenant in Scotland who shall have improved within the ten preceding years the Pasturage of not less than thirty acres, by means of top-dressing, draining, or otherwise, without tillage, in situations where tillage may be inexpedient—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

6. By the Tenant in Scotland who shall have improved not less than ten acres within a similar period—The Minor Gold Medal. To be lodged by 1st November in any year.

Reports in competition for Nos. 5 and 6 must state the particular mode of management adopted, the substances applied, the elevation and nature of the soil, its previous natural products, and the changes produced.

SECTION 3.—HIGHLAND INDUSTRIES AND FISHERIES.

FOR APPROVED REPORTS.

1. The best mode of treating native Wool; cleaning, carding, dyeing, spinning, knitting, and weaving by hand in the Highlands and Islands of Scotland—Five Sovereigns. To be lodged by 1st November in any year.

SECTION 4.—MACHINERY.

FOR APPROVED REPORTS.

To be lodged by 1st November in any year.

SECTION 5.—FORESTRY DEPARTMENT.

FOR APPROVED REPORTS.

1. On Plantations of not less than eight years' standing formed on deep peat-bog—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November in any year.

The premium is strictly applicable to deep peat or flow moss; the condition of the moss previous to planting, as well as at the date of the Report, should, if possible, be stated.

The Report must describe the mode and extent of the drainage, and the effect it has had in subsiding the moss—the trenching, levelling, or other preliminary operations that may have been performed on the surface—the mode of planting—kinds, sizes, and number of trees planted per acre—and their relative progress and value, as compared with plantations of a similar age and description grown on other soils in the vicinity.

CLASS II.

DISTRICT COMPETITIONS.

REGULATIONS 1922.

Grants in aid of DISTRICT COMPETITIONS for 1923 must be applied for before 1st November 1922, on Forms to be obtained from the Secretary.

When a Money Grant has expired, the District cannot apply again for another Money Grant for four years.

SECTION I.—GRANTS TO DISTRICT SOCIETIES FOR HORSES, CATTLE, SHEEP, AND PIGS.

1. CLASS OF STOCK—LIMIT OF GRANTS, £340.—The Highland and Agricultural Society will make Grants to District Societies for prizes for *Breeding Animals* of any of the following Classes of Stock, viz. :—

<i>Cattle.</i>	<i>Sheep.</i>
Shorthorn.	Blackface.
Aberdeen-Angus.	Cheviot.
Galloway.	Border Leicester.
Highland.	Half-Bred.
Ayrshire.	Shropshire.
British-Friesian.	Oxford-Down.
Jersey.	Suffolk.
Shetland.	Wensleydale.
<i>Horses.</i>	<i>Pigs.</i>
Draught Horses.	Any Pure Breed.
Hunters.	
Hackneys.	
Ponies.	
Shetland Ponies.	

Cross-bred¹ animals are not eligible. The Prizes must be confined to *Breeding Animals*; "bullocks," "geldings," "wethers," and "hog pigs" are excluded.

2. All Competitions must be at the instance of a local Society. A Committee of Management shall be appointed, and the Convener of the Committee must be a Member of the Highland and Agricultural Society.

3. GRANT TO DISTRICT, £12.—The portion of the Grant to any one District Society shall not exceed the sum of £12 in any one year.

4. ALLOCATION OF GRANT.—The Grant from the Highland and Agricultural Society is not to be applied as a Grant in aid of the Premiums offered by the Local Society, but must be offered in the form of separate Prizes for the Animals chosen; and the Prizes must be announced in the Premium List and Catalogue of the Show as "given by the Highland and Agricultural Society."

5. CONTINUANCE OF GRANT THREE YEARS.—The Money Grant shall continue for three alternate years, provided always that the District Society shall, in the two intermediate years, continue the competition by offering Premiums for the same class of Stock as that selected in each previous year to compete for the Highland and Agricultural Society's Prizes. If no competition takes place for two years the Grant expires.

¹ *Exceptions to this rule may, however, be authorised by the Board of Directors, on application. The Directors are prepared to consider applications from local Societies which desire to use their grants, or part thereof, as prizes for cross-bred calves and one-year-old cross-bred cattle.*

6. When it is agreed to hold the General Show of the Society in any district, no provincial show shall be held in that district in the months of June, July, or August.

7. MEDALS IN INTERMEDIATE YEARS.—In the two alternate years the Highland and Agricultural Society will place three Silver Medals at the disposal of the District Societies, for the same classes of Stock as those for which the Money Premiums are offered, provided that not less than three lots are exhibited in the same class.

8. RULES OF COMPETITION.—The Rules of Competition for the Premiums, the Funds for which are derived from Grants of the Highland and Agricultural Society, shall be such as are generally enforced by the Society receiving the Grant for Premiums offered by itself.

9. AREA AND PARISHES—FIVE PARISHES.—When making application for Grants from the Highland and Agricultural Society, the District Society must delineate the area and the number of parishes comprised in the district, and, *except in special cases*, no District Society shall be entitled to a Grant whose show is not open to at least five Parishes.

10. REPORTS.—Blank Forms for Reports will be furnished to the Secretaries of the different District Societies. Both in the years when the Grant is offered and in the two intermediate years, detailed reports of the competition must be given on these Forms and lodged with the Secretary of the Highland and Agricultural Society as soon as possible after the Show, and in no case later than 1st November. These reports are subject to the approval of the Directors of the Highland and Agricultural Society, against whose decision there shall be no appeal. All Reports must be signed and certified as marked in the Form.

11. GRANTS—WHEN PAID.—The Grants made to District Societies will be paid in December after the Reports of the awards of the prizes have been received and found to be in order and passed by the Board of Directors, the Money Grants being paid to the Secretaries of the Local Societies and the Medals sent direct to the winners. *The Secretary of the District Society must not on any condition whatever pay any premium offered by the Highland and Agricultural Society until he has been informed that the awards are in order and has received the Grant from the Highland and Agricultural Society.*

12. RENEWAL OF APPLICATION.—No application for renewal of a Money Grant to a District Society will be entertained until the expiration of four years from the termination of the last Grant.

13. DISPOSAL OF APPLICATIONS.—In disposing of applications for District Grants, the Directors of the Highland and Agricultural Society shall keep in view the length of interval that has elapsed since the expiration of the last Grant, giving priority to those District Societies which have been longest off the list.

DISTRICTS.

Final Year.

1. MOFFAT AND UPPER ANNANDALE AGRICULTURAL AND HORTICULTURAL SOCIETY.—*Convener*, George E. Bruges, Middlegill, Moffat; *Secretary*, Edward C. Bruges, Archbank, Moffat. Granted 1911. (In abeyance 1914, 1915, 1916, 1917, 1918, 1919, and 1920—no Show held.)
2. ISLAY, JURA, AND COLONSAY AGRICULTURAL ASSOCIATION.—*Convener and Secretary*, Robert Cullen, Bridgend, Islay. Granted 1912. (In abeyance in 1913 on account of the Paisley Show.) (In abeyance 1914, 1915, 1916, 1917, and 1918—no Show held.)

3. ARDOCH AGRICULTURAL SOCIETY.—*Convener*, Henry G. Macfarlane, Netherton, Blackford; *Secretary*, Peter Fisher, Braehead, Braco, Perthshire. Granted 1914. (In abeyance 1915, 1916, 1917, and 1918—no Show held.)
4. LANARKSHIRE FARMERS' SOCIETY.—*Convener*, Alexander Torrance, Crookedstone, Quarter; *Secretary*, Archibald Clark, Union Bank of Scotland, Ltd., Hamilton. Granted 1915. (In abeyance 1916, 1917, and 1918—no Show held.)
5. MORAYSHIRE FARMER CLUB.—*Convener*, G. A. Ferguson, Surradale, Elgin; *Secretary*, W. Rose Black, Solicitor, Elgin. Granted 1915. (In abeyance 1916, 1917, and 1918—no Show held.)
6. UPPER WARD OF LANARKSHIRE AGRICULTURAL SOCIETY.—*Convener*, George Findlater, Jerviswood Mains, Lanark; *Secretary*, William Shaw, Royal Bank House, Lanark. Granted 1916. (In abeyance 1917 and 1918—no Show held.)

2nd Year.

7. ARGYLL CATTLE SHOW SOCIETY.—*Convener*, Captain John Campbell of Kilberry; *Secretary*, James M'Dougall, South Cliff, Tarbert, Lochfyne. Granted 1910. (In abeyance in 1910—unable to hold a show. In abeyance in 1913 on account of the Paisley Show.) (In abeyance 1914, 1915, 1916, 1917, 1918, 1919, 1920, and 1921—no Show held.)
8. EASTER ROSS FARMERS' CLUB.—*Convener*, James Scott, Fearn; *Secretary*, George D. Gill, Commercial Bank Buildings, Tain. Granted 1914. (In abeyance 1914, 1915, 1916, 1917, 1918, and 1919—no Show held.)
9. MOUNT BLAIR AGRICULTURAL SOCIETY.—*Convener*, James M'L. Marshall, Bleaton Hallet, Blairgowrie; *Secretary*, A. Dewar, Kirk michael, Blairgowrie. Granted 1915. (In abeyance 1915, 1916, 1917, 1918, and 1919—no Show held.)
10. BUCHLYVIE AND GARTMORE AGRICULTURAL SOCIETY.—*Convener*, James Stewart, Cashley, Buchlyvie; *Secretary*, James Monach, Craignorton, Buchlyvie. Granted 1916. (In abeyance 1916, 1917, 1918, and 1919—no Show held.)
11. UNITED BANFFSHIRE AGRICULTURAL SOCIETY.—*Convener*, George Walker Cowie of Easter Bo, Fisherie, Turriff; *Secretary*, F. A. Watt, Solicitor, Banff. Granted 1915. (In abeyance 1916, 1917, and 1918—no Show held; 1919, not awarded.) (In abeyance 1920 on account of the Aberdeen Show.)
12. DALKEITH AGRICULTURAL SOCIETY.—*Convener*, John P. Alison, D'Arcy, Dalkeith; *Secretary*, James W. Speedy, Braeside, Liberton. Granted 1916. (In abeyance in 1916—no Show held.) (In abeyance in 1917, 1918, and 1919 on account of the Edinburgh Show.)
13. DUMBARTONSHIRE AGRICULTURAL SOCIETY.—*Convener*, Alex. Y. Allan, Aitkenbar, Dumbarton; *Secretary*, George Lawrence, Union Bank of Scotland, Ltd., Dumbarton. Granted 1916. (In abeyance 1916, 1917, 1918, and 1919—no Show held.)
14. CARNWATH AGRICULTURAL SOCIETY.—*Convener*, Andrew S. Lawson, Guildhouse, Forth, by Lanark; *Secretary*, Andrew T. Morrison, Commercial Bank House, Carnwath. Granted 1920.
15. NETHER LORN FARMERS' SOCIETY.—*Convener*, Colin C. M'Dougall, Clachan, Seil, by Oban; *Secretary*, Neil MacDougall, Balvicar, Oban. Granted 1920.
16. SUTHERLAND FARMERS' CLUB.—*Convener*, James D. Cameron, Kirkton, Golspie; *Secretary*, Charles B. Catto, Drummie, Golspie. Granted 1920.

1st Year.

17. DUNBLANE AGRICULTURAL SOCIETY.—*Convener*, A. H. Anderson, Kippendavie Estate Office, Dunblane; *Secretary*, John Steward, Solicitor, Dunblane. Granted 1921. (In abeyance 1921.)
18. UPPER DONSIDE AGRICULTURAL SOCIETY.—*Convener*, John Walker, West Side of Brux, Kildrummy-mossat; *Secretary*, Alexander Y. Robertson, Upper Towie, Glenkindie. Granted 1922.
19. VALE OF ALFORD AGRICULTURAL ASSOCIATION.—*Convener*, W. A. Mitchell, Auchnagathle, Keig, Whitehouse; *Secretary*, George F. Laing, Mayfield, Whitehouse. Granted 1922.
20. WESTERN DISTRICT OF MID-LOTHIAN AGRICULTURAL SOCIETY.—*Convener*, G. Gardiner Smith of Linwood, Mid-Calder; *Secretary*, John Memgall, Bank House, West Calder. Granted 1922.
21. STRATHORD AGRICULTURAL SOCIETY.—*Convener*, James Paton, J.P., Obney, Meikle Obney, Bankfoot; *Joint-Secretaries*, William Baxter, Tophead, Stanley; D. M'Gregor, Rosebank, Bankfoot. Granted 1922.
22. BLACK ISLE FARMERS' SOCIETY.—*Convener*, Captain D. Morison, Navity, Cromarty; *Secretary*, John Mann, Bog Farm, Munloch. Granted 1922.
23. STIRLING AGRICULTURAL SOCIETY.—*Convener*, William M'Laren, Inch, Kincardine-on-Forth; *Secretary*, Andrew C. Buchanan, 26 Port Street, Stirling. Granted 1922.

(In Intermediate Year—3 Silver Medals.)

24. LIDDESDALE AGRICULTURAL SOCIETY.—*Convener*, David Ballantyne, Shaws, Newcastleton; *Secretary*, Robert Brown, British Linen Bank, Newcastleton. Granted 1913. (In abeyance in 1914 on account of the Hawick Show.) (1915, 1916, 1917, 1918, 1919, 1920, and 1921—no Show held.)
25. YARROW AND ETRICK PASTORAL.—*Convener*, James Laidlaw, Bowerhope, Yarrow; *Secretary*, Willam Hunter, West Port, Selkirk. Granted 1913. (In abeyance in 1914 on account of the Hawick Show.) (1915, 1916, 1917, 1918, and 1919—no Show held.)
26. INVERNESS-SHIRE FARMERS' SOCIETY.—*President*, W. A. Cumming, Allanfearn, by Inverness; *Secretary*, David Macdonald, 15 High Street, Inverness. Granted 1916. (In abeyance 1917, 1918, and 1919—no Show held.)
27. GIRVAN DISTRICT AGRICULTURAL SOCIETY.—*Convener*, W. K. Bone, Skalloch Park, Girvan; *Secretary*, Jean W. Kennedy, Town Clerk's Chambers, Girvan. Granted 1920. (In abeyance 1921.)
28. AIRD AND STRATHGLASS AGRICULTURAL, HORTICULTURAL, AND INDUSTRIAL SOCIETY.—*Convener*, John H. Gair, East Moniac, Kirkhill; *Secretary*, John Campbell, Commercial Bank of Scotland, Beauly. Granted 1921.
29. FETTERCAIRN FARMERS' CLUB.—*Convener*, W. Dickson, Gossesslie, Laurencekirk; *Secretary*, George T. Brown, East Cairnbeg, For-doun. Granted 1921.
30. MAR AGRICULTURAL ASSOCIATION.—*Convener*, R. Littlejohn Barr, The Manse, Kinellar; *Secretary*, Neil Smith, Kinellar, Aberdeenshire. Granted 1921.
31. STRATHAVEN AND DISTRICT AGRICULTURAL EXPOSITION SOCIETY.—*Convener*, A. M. Simpson, White Cross, E. Kilbride; *Secretary*, John Watson, Newton, Strathaven. Granted 1921.

(In Abeyance 1922.)

32. DUMFRIES AGRICULTURAL SOCIETY.—*Convener*, Col. F. J. Carruthers of Dormont, Lockerbie; *Secretary*, David Fergusson, 75 Buccleuch Street, Dumfries. Granted 1920.
33. LOCKERBIE AGRICULTURAL SOCIETY.—*Convener*, D. J. Bell Irving, Whitehill, Lockerbie; *Secretary*, Thomas Henderson, Solicitor, Lockerbie. Granted 1920.

In 1921.

Nos. 1, 2, 3, 4, 5, and 6 are in competition for the final year.

Nos. 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16 are in competition for the second year.

Nos. 17, 18, 19, 20, 21, 22, and 23 are in competition for the first year.

Nos. 24, 25, 26, 27, 28, 29, 30, and 31 are in intermediate year and compete for local Premiums. (See Rules 5 and 7.)

Nos. 32 and 33 are in abeyance on account of the Dumfries Show.

SECTION II.—GRANTS TO HORSE ASSOCIATIONS, &c., FOR STALLIONS FOR AGRICULTURAL PURPOSES.

1. The Highland and Agricultural Society will make Grants to Horse Associations and other Societies in different districts engaging Stallions for agricultural purposes. The total sum expended by the Highland and Agricultural Society in such Grants shall not exceed the sum of £210 in any one year.

2. The portion of the Grant to any one Association or Society shall not exceed the sum of £15 in any one year.

3. The Grant will be available only for Stallions which, for the year to which the Grant applies, are Registered in the Register of Certified Draught Stallions published by the Board of Agriculture. (For information regarding the Registration of Stallions, apply to the Secretary of the Board of Agriculture, 4 Whitehall Place, London, S.W.)

4. The Grant will continue for three years provided the Association receiving the Grant shall hire a Registered Stallion in the two intermediate years.

5. In the event of a Horse not being engaged in any one year while the provisions of the Grant are in force, the Grant made by the Highland and Agricultural Society will cease.

6. RULES 2 (Committee and Convener), 10 (Reports), 11 (Time of Payment), 12 (Renewal of Grant), and 13 (Disposal of Applications) applicable to Section 1, shall be applicable to this Section.

DISTRICTS.

Final Year.

1. LORN CLYDESDALE HORSE SOCIETY.—*Convener*, John Brown, Kilmore, Oban; *Secretary*, Hugh M'Innes, Lower Gylan, Kerrara, Oban. Granted 1918.
2. NAIRNSHIRE FARMING SOCIETY.—*Convener*, Alexander Campbell, Viewhill, Gollanfield; *Secretary*, D. M. Symon, Milton of Moyness, Auldearn. Granted 1918.
3. SCOTTISH CENTRAL HORSE-BREEDING SOCIETY.—*Convener*, William Meiklem, Begg, Kirkcaldy; *Secretary*, William Carrick, The Baad, Stirling. Granted 1918.

4. LAMMERMOOR PASTORAL SOCIETY.—*Convener*, Walter Elliot, Harehead, Duns; *Secretary*, Thomas Stephenson, Chapel, Duns. Granted 1918.
5. UPPER WARD OF LANARKSHIRE AGRICULTURAL SOCIETY.—*Convener*, George Paterson, Drumfalbin, Lanark; *Secretary*, William Shaw, Royal Bank of Scotland, Lanark. Granted 1918.

2nd Year.

6. CAMPBELTOWN AND SOUTHEND HORSE-BREEDING SOCIETY.—*Convener*, James M'Eachy, Clochkiel, Campbeltown; *Secretary*, John Barbour, Aucharna, Campbeltown. Granted 1920.

1st Year.

7. DEESIDE STOCK IMPROVEMENT SOCIETY.—*Convener*, Sir Thomas Burnett of Crathes and Leys, Crathes Castle, Crathes; *Secretary*, James Cooper, Ley Banchory. Granted 1922.
8. ISLAY SMALL LANDHOLDERS' SOCIETY.—*Convener and Secretary*, Robert Cullen, Bridgend, Islay. Granted 1922.
9. GIGHA HEAVY HORSE-BREEDING SOCIETY.—*Convener*, Malcolm M'Sporran, Drimyonmore, Gigha; *Secretary*, Isaac Love, The Schoolhouse, Gigha. Granted 1922.
10. STONEHAVEN DISTRICT HORSE-BREEDING ASSOCIATION.—*Convener*, Joseph Hutcheon, Bourtreesbush, Newtonhill; *Secretary*, James B. Connon, 12 Ann Street, Stonehaven. Granted 1922.
11. MORAYSHIRE STOCK IMPROVEMENT SOCIETY. *Convener*, Gordon R. Shiach, Ardgilzean, Elgin; *Secretary*, W. Rose Black, Bank Buildings, Elgin. Granted 1922.
12. SHAPANSEY AGRICULTURAL ASSOCIATION.—*Convener*, James Johnston of Coubister, Orphir House, Orphir, Orkney; *Secretary*, William Robertson, Elwichbank, Shapansey, Orkney. Granted 1922.

Intermediate Year—Grant in Abeyance.

13. DUNBLANE, DOUNE, AND CALLANDER HORSE-BREEDING SOCIETY.—*Convener*, John Scrimgeour, Estate Office, Doune; *Secretary*, William D. MacLaren, Drummore, Doune, Perthshire. Granted 1919.
14. MID-ARGYLL AGRICULTURAL SOCIETY.—*Convener*, Colonel E. D. Malcolm, C.B., of Poltalloch, Kilmartin; *Secretary*, James Lindsay, Solicitor, Ardrishaig. Granted 1919.
15. DUMBARTONSHIRE HORSE-BREEDING SOCIETY.—*Convener*, James Snodgrass, Millig Farm, Helensburgh; *Secretary*, William Davie, 283 Main Street, Alexandria. Granted 1921.
16. GATEHOUSE DISTRICT HORSE-BREEDING SOCIETY.—*Convener*, Fred J. Turner, Caly Estate Office, Gatehouse of Fleet; *Secretary*, D. Y. Veitch, Portville, Gatehouse of Fleet. Granted 1921.
17. STIRLING DISTRICT CLYDESDALE HORSE SOCIETY.—*Convener*, James Rodger, Keir Mains, Dunblane; *Secretary*, Alexander Paterson, Solicitor, Stirling. Granted 1921.

In 1921.

Nos. 1, 2, 3, 4, and 5 are in competition for the final year.

No. 6 is in competition for the second year.

Nos. 7, 8, 9, 10, 11, and 12 are in competition for the first year.

Nos. 13, 14, 15, 16, and 17 are in abeyance, and compete for local premiums. (See Rule 4.)

SPECIAL GRANTS.

ANNUAL.

- £15 to the Northern Arts and Crafts Society.—*Joint-Secretaries*, Mrs Hugh Walker, Kingsmills, and Miss Mary Mackintosh, Raigmore, Inverness. Granted 1922.
- £20 to the Ayrshire Agricultural Association, to be competed for at the Dairy Produce Show at Kilmarnock.—*Convener*, James Middleton, Estate Office, Braehead, Kilmarnock; *Secretary*, John Howie, 58 Alloway Street, Ayr. Granted 1872. (No competition 1914, 1915, 1916, 1917, 1918, and 1919.)
- The British Dairymaids' Association.—*Convener*, Mrs J. H. R. Turnbull, 7 W. Maitland Street, Edinburgh; *Secretary*, Miss Mary B. Baillie, Rosebank, Currie. 1 Minor Gold Medal and 1 Medium Silver Medal for Champion Butter-making Competitions. Granted 1908. (In abeyance 1914, 1915, 1916, 1917, and 1918—no competition.)
- The Fife Agricultural Society.—*Convener*, Lord Cochrane of Cults, Crawford Priory, Springfield, Fife; *Secretary*, F. W. Christie, Eden View, Cupar. 1 Minor Gold Medal and 1 Medium Silver Medal for Butter-making Competition, open to the United Kingdom. Granted for 1922 only.

IN ALTERNATE YEARS.—GRANT IN 1922.

- £5 to Shetland Agricultural Society.—*Convener*, J. M. Goudie, Lerwick; *Secretary*, James J. Brown, Lerwick. Granted 1893. (In abeyance—no Show in 1914, 1915, 1916, 1917, 1918, or 1919.)
- £3 to North Uist Agricultural Society.—*Convener*, Dr M. T. Mackenzie, J.P., Scolpaig, North Uist; *Secretary*, H. H. Mackenzie, J.P., Balelone, Lochmaddy. Granted in 1915 for 3 alternate years. (In abeyance 1915, 1916, 1917, 1918, and 1919—no Show held.)
- £3 to Rousay, Orkney.—*Convener*, John Logie, Trumbland, Rousay, Orkney; *Secretary*, John Harrold, Springfield, Rousay. Granted 1903. (No Show 1915, 1916, 1917, or 1918.)
- £3 to South Ronaldshay and Burray, Orkney.—*Convener*, John Tomison, Halcro, St Margaret's Hope, Orkney; *Secretary*, George Esson, St Margaret's Hope, Orkney. Granted 1904. (In abeyance 1917 and 1918—no Show held.)

GRANTS IN ABEYANCE, 1922.

- £3 to Orkney.—*Convener*, James Johnston, of Coubister, Orphir House, Orphir, Orkney; *Secretary*, D. B. Peace, jun., Auctioneer, Kirkwall. Granted 1883. (No Show in 1915, 1916, 1917, and 1918.)
- £3 to Sanday, Orkney.—*Convener*, W. Cowper Ward, Scar House, Sanday, Orkney; *Secretary*, James Irvine, Stove Farm, Sanday, Orkney. Granted 1902. (In abeyance 1915, 1916, 1917, and 1918—no Show held.)
- £3 to East Mainland, Orkney.—*Convener*, John Clouston, Graemeshall, Holm, by Kirkwall; *Secretary*, Alexander Calder, Seabay, Tankerness, Kirkwall. Granted 1898. (In abeyance 1917 and 1918—no Show held.)

£3 to West Mainland, Orkney.—*Convener*, James M. H. Robertson, Lyking, Sandwick, Orkney; *Secretary*, George Learmonth, Pow, Quoyloo, by Stromness, Orkney. Granted 1900. (No Show 1916, 1917, or 1918.)

WOMEN'S RURAL INSTITUTES.

A sum not exceeding £100 in each year will be given in special grants to Federations of Scottish Women's Rural Institutes. The amount of any one grant shall not exceed £10. Any Institute which has received a grant for two consecutive years shall not be eligible to again apply until after the expiry of two years.

£10 to Lanarkshire Federation of Scottish Women's Rural Institutes.—*Hon. Sec.*, Mrs Douglas, Auchlochan, Lesmahagow. Granted 1921.

£10 to Rhins Federation of Women's Rural Institutes.—*Hon. Sec.*, Miss M. A. L. Menzies, Ardwell, Wigtownshire. Granted 1922.

£10 to Ayrshire Federation of Women's Institutes.—*Hon. Sec.*, Mrs E. L. Houson-Crauford, Dunlop House, Dunlop. Granted 1922.

MEDALS IN AID OF PREMIUMS GIVEN BY LOCAL SOCIETIES.

The Society, being anxious to co-operate with local Associations, will give a limited number of Silver Medals annually to Societies, not on the list of Cattle, Horse, or Sheep Premiums, in addition to the Money Premiums awarded in the Districts, for—

1. Best Bull, Cow, or Heifer of any pure breed included in Section 1.
2. Best Stallion, or Mare of any pure breed included in Section 1.
3. Best Tup, or Pen of Ewes of any pure breed included in Section 1.
4. Best Boar, Sow, or Breeding-Pig of any pure breed.
5. Best Pens of Poultry.
6. Best Sample of any variety of Wool.
7. Best Sample of any variety of Seeds.
8. Best managed Farm.
9. Best managed Green Crop.
10. Best managed Hay Crop.
11. Best managed Dairy.
12. Best Sweet-Milk Cheese.
13. Best Cured Butter.
14. Best Fresh Butter.
15. Best collection of Roots.
16. Best kept Fences.
17. Best Sheep-Shearer.
18. Most expert Hedge-Cutter.
19. Most expert Labourer at Draining.
20. Best Maker of Oat-Cakes.

It is left to the local Society to choose out of the foregoing list the classes for which the Medals are to be competed.

The Medals are granted for two years, and lapse if not awarded in those years.

No Society shall receive more than two Medals in any year.

Aberdeenshire.

1. KINNETHMONT AGRICULTURAL SOCIETY.—*Convener*, G. E. N. Leith Hay, Leith Hall, Kinnethmont; *Secretary*, John Reid, Benview, Kinnethmont. 2 Medals. 1921.
2. GARIOCH FARMER CLUB.—*Convener*, John A. Cooper, Dunnydeer, Inch; *Secretary*, J. Anderson, Commercial Bank of Scotland, Ltd., Inch. 2 Medals. 1921.
3. NEW DEER AGRICULTURAL SOCIETY.—*Convener*, David M. Godsman, Mains of Fedderate, New Deer; *Secretary*, P. Crichton, 1 Main Street, New Deer. 2 Medals. 1922.

Argyllshire.

4. APPIN AGRICULTURAL SHOW SOCIETY.—*Convener*, R. H. Corson, Auchindarroch, Duror; *Secretary*, Donald Macpherson, Schoolhouse, Appin. 2 Medals. 1921.
5. TIRREE AGRICULTURAL SHOW COMMITTEE.—*Convener*, Hugh Macdiarmid, Island House, Tiree, by Oban; *Secretary*, W. G. Macdiarmid, Island House, Tiree, by Oban.

Banffshire.

6. SPEY, AVEN AND FIDDOCHSIDE FARMING SOCIETY.—*Convener*, George Grant, Glenfarclas, Blackshoat; *Secretary*, R. Dick Stuart, Seafield Square, Rothes. 2 Medals. 1921.

Dumbartonshire.

7. CUMBERNAULD AGRICULTURAL SOCIETY.—*Convener*, John Torrance, Hetlerwood, Castlecary, by Bonnybridge; *Secretaries*, R. B. Henderson and John Longwell, Parkview, Cumbernauld. 2 Medals. 1921.

Dumfriesshire.

8. SANQUHAR FARMERS' SOCIETY.—*Convener*, James Moffat, Gateside, Sanquhar; *Secretary*, W. M. Henderson, Solicitor, Sanquhar. 2 Medals. 1914. (In abeyance 1914, 1915, 1916, 1917, 1918, 1919, 1920, and 1921—no Show held.)

Kirkcudbrightshire.

9. ST MARY'S ISLE ESTATES AND DISTRICT AGRICULTURAL SOCIETY.—*Convener*, James Phillips, Carse, Kirkcudbright; *Secretaries*, John Gibson and Robert Montgomery, Solicitors, Kirkcudbright. 2 Medals. 1921.

Inverness-shire and Morayshire.

10. STRATHSPEY FARMERS' CLUB.—*Convener*, Lieut.-Colonel J. Grant Smith, D.S.O., Inverallan, Grantown-on-Spey; *Secretary*, John G. MacDougall, Dunolly, Grantown-on-Spey. 2 Medals. 1921.

Orkney.

11. WALLS AND HOY AGRICULTURAL SOCIETY.—*Convener*, Robert Cutt, Melsetter Farm, Melsetter, Orkney; *Secretary*, William Sutherland, Old Customhouse, Longhope. 2 Medals. 1921.

Perthshire.

12. MOULIN AGRICULTURAL ASSOCIATION.—*Convener and Secretary*, R. M'Gillewie, Ruanruarie, Killiecrankie. 2 Medals. 1922.

Sutherlandshire.

13. SUTHERLAND CROFTERS' SHOW SOCIETY.—*Convener and Secretary* J. M'Callum, Sutherland Estate Office, Golspie. 2 Medals. 1921.

Wigtownshire.

14. GALLOWAY DAIRY PRODUCE SHOW SOCIETY.—*Convener*, Sir Mark J. M'Taggart Stewart, Bart., Southwick, Dumfries; *Secretary*, Patrick Gifford, 188 King Street, Castle-Douglas. 2 Medals. 1922.

Applications from other Districts must be lodged with the Secretary of the Society by 1st November next.

RULES OF COMPETITION.

1. All Competitions must be at the instance of a local Society.
2. The classes for which Medals are granted must be in accordance with the list at page 57. The Committee shall select the classes, and specify them in the Report.
3. A Committee of Management shall be appointed, and the Convener of the Committee must be a Member of the Highland and Agricultural Society.
4. The Money Premiums given in the District must be not less than £2 for each Medal claimed.
5. The Medal for Sheep-Shearing shall always accompany the highest Money Premium.
6. There must not be fewer than three competitors in all the classes.
7. Regarding Reports, despatch of Medals, and application for renewal of Grant, Rules 10 and 11, Section I., will apply.
8. When a grant of Medals has expired, the District cannot apply again for Medals for two years.

PLOUGHING COMPETITIONS.

The Minor Silver Medal will be given to the winner of the first Premium at Ploughing Competitions, provided a Report in the following terms on the official form is made to the Secretary, within one month of the Competition, by a Member of the Society. Forms of Report to be had on application.

FORM OF REPORT.

I, _____ of _____, Member of the Highland and Agricultural Society, hereby certify that I attended the Ploughing Match of the _____ Association at _____ in the county of _____ on the _____ when _____ ploughs competed ; _____ of land were assigned to each, and _____ hours were allowed for the execution of the work. The sum of £ _____ was awarded in the following proportions, viz. :—

[Here enumerate the names and designations of successful Competitors.]

RULES OF COMPETITION.

1. All Matches must be at the instance of a local Society or Ploughing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society, 3 George IV. Bridge, Edinburgh.

3. Not more than one Match in the same season can take place within the bounds of the same Society or Association.

4. All reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.

5. A Member can only report one Match ; and a Ploughman cannot carry more than three Medals in the same season.

6. To warrant the grant of the Medal there must have been twelve ploughs in Competition, and not less than Three Pounds awarded in Prizes by the local Society. The Medal to be given to the winner of the first prize.

7. The Local Committee or Society may, if they desire, arrange to let each ploughman have one person to guide the horses for the first two and the last two furrows, but in no case shall ploughmen receive any other assistance, and their work must not be set up nor touched by others. Attention should be given to the firmness and sufficiency of the work below more than to its neatness above the surface.

8. The Local Committee is required to fix the time to be allowed for ploughing the portion of land, and they are recommended that the time be at the rate of not more than ten hours per imperial acre on light land, and fourteen hours on heavy or stony land.

HOEING COMPETITIONS.

The Minor Silver Medal will be given to the winner of the first Premium at Hoeing Competitions, provided a Report in the following terms on the official form is made to the Secretary within a month of the Competition by a Member of the Society. Forms of Report to be had on application.

RULES OF COMPETITION.

1. All Matches must be at the instance of a local Society or Hoeing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society, No. 3 George IV. Bridge, Edinburgh.

3. Not more than one match in the same season can take place within the bounds of the same Society or Association.

4. All reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.

5. A Member can only report one Match ; and same Competitor cannot carry more than three Medals in the same season.

6. To warrant the grant of the Medal there must have been twelve hoes in Competition, and not less than Three Pounds awarded in prizes by the local Society. The Medal to be given to the winner of the first prize.

7. The time to be allowed to be decided by the local Committee, but in no case to exceed two hours for two drills of 100 yards each, the third drill being unoccupied, so that Competitors do not interfere with their neighbour's work.

8. Competitors must finish their work as they go along—no turning back or after-dressing allowed. Handpicking or transplanting shall be strictly prohibited.

9. A Committee shall be appointed to watch the work, and any Competitor found transplanting or otherwise not complying with the Rules shall have his number withdrawn, and be debarred from receiving any prize which might otherwise have been awarded to him.

NOTE.—Medals will be awarded under similar conditions for Competitions in hand-singling.

LONG SERVICE CERTIFICATES AND MEDALS.

Certificates and Medals for long service are awarded by the Society to farm servants, male or female, having an approved service of not less than thirty years—(a) with one employer on the same or different holdings ; (b) on the same holding with different employers. These Certificates and Medals will be issued as applications are received.

Forms to be obtained from the Secretary.

CLASS III.

COTTAGES AND GARDENS.

The following Premiums are offered for Competition in the Parishes after mentioned.

The Premiums are granted for two years.

PREMIUMS FOR BEST KEPT COTTAGES AND GARDENS.

1. Best kept Cottage	.	.	.	.	.	£1	0	0
Second best	.	.	.	.	.	0	10	0
2. Best kept Cottage Garden	.	.	.	.	.	1	0	0
Second best	.	.	.	.	.	0	10	0

RULES OF COMPETITION.

1. Competitions may take place in the different parishes for Cottages and Gardens, or for either separately.

2. The occupiers of Lodges at Gentlemen's Approach Gates and Gardeners' Houses are excluded, as well as others whom the Committee consider, from their position, not to be entitled to compete. The inspection must be completed by the 1st of October. In making the inspection, the Conveners may take the assistance of any competent judges.

3. It is left to the Committee of the District to regulate the maximum annual rent of the Cottages, which may, with the garden, be from £5 to £7.

4. To warrant the award of full Premiums, there must not be fewer than three competitors in each class. If there are less than three competitors in each class, only half Premium will be awarded.

5. A person who has gained the highest Premium cannot compete again.

6. If the Cottage is occupied by the proprietor, the roof must be in good repair; if the roof is thatch, it must be in good repair, though in the occupation of a tenant. The interior and external conveniences must be clean and orderly; the windows must be free of broken glass, clean, and affording the means of ventilation. Dunghills, and all other nuisances, must be removed from the front and gables. In awarding the Cottage Premiums, preference will be given to Competitors who, in addition to the above requisites, have displayed the greatest taste in ornamenting the exterior of their houses, and the ground in front and at the gables.

7. In estimating the claims for the Garden Premiums, the judges should have in view—the sufficiency and neatness of the fences and walks; the cleanness of the ground; the quality and choice of the crops; and the general productiveness of the garden.

8. Reports, stating the number of Competitors, the names of successful parties, and the nature of the exertions which have been made by them, must be lodged with the Secretary of the Highland and Agricultural Society *on or before the 1st November next*.

9. When a grant of Money has expired, the District cannot apply again for aid for four years.

Parishes desirous of these Premiums must lodge applications with the Secretary *on or before the 1st November next*.

(No Money Grants offered in 1922.)

MEDALS FOR COTTAGES AND GARDENS, OR GARDEN PRODUCE, POULTRY, AND BEE-KEEPING.

1. The Society will give annually one or two Minor Silver Medals to a limited number of local Associations or individuals, who establish Competitions and Premiums for Cottages, Gardens, Garden Produce, or Bee-Keeping. The Medals will be granted for two years.

2. The Medals may be offered in any two of the following sections, *but under no circumstances will the two Medals be given in one of the sections:—*

(1) Best kept Cottage or best kept Cottage and Garden. (One Medal only.)

(2) Best kept Garden. (One Medal only.)

(3) Best Collection of Garden Produce—Flowers excluded. (One Medal only.)

(4) Best Pen of Poultry.

(5) Honey. (One Medal only.)

3. The annual value of each Cottage, with the ground occupied in the parish by a Competitor, must not exceed £15. The occupiers of Lodges at Gentlemen's Approach Gates, and Gardeners in the employment of others, are not entitled to compete.

4. If Competition takes place for Garden Produce, such produce must be *bona fide* grown in the Exhibitor's Garden. He will not be allowed to make up a collection from any other Garden. The produce must consist of Vegetables, or Vegetables and Fruit (not Fruit alone). Flowers are excluded.

5. The Honey must be the produce of the Exhibitor's own Hives.

6. To warrant the award of a Medal, there must not be fewer than three Competitors.

7. Blank forms for Reports of Competitions will be furnished to the Secretaries of the different Districts. These must, in all details, be completed and lodged with the Secretary of the Highland and Agricultural Society as soon as possible after the Show, and in no case later than *1st November*, for the approval of the Directors, against whose decisions there shall be no appeal.

8. When a grant of Medals has expired, the District cannot apply again for aid for two years, and if no competition takes place in a District for two years the grant expires.

* 9. Applications for these Medals must be made *before 1st November next*.

Fifeshire.

1. NEWBURGH GARDENING SOCIETY.—*Convener*, Andrew Kay, Hillside Cottage, Newburgh; *Secretary*, David M. Adamson, High Street, Newburgh. 2 Medals. 1916. (In abeyance 1916, 1917, 1918, 1920, and 1921—no Show held.)

Morayshire.

2. MORAYSHIRE FARMERS' CLUB.—*Convener*, George A. Ferguson, Surradale, Elgin; *Secretary*, W. Rose Black, Bank Buildings, Elgin. 2 Medals. 1922.

Perthshire.

3. BRACO HORTICULTURAL SOCIETY.—*Convener*, John W. Stirling, J.P., Braco; *Secretary*, William M'Illdowie, Crofthead, Braco. 2 Medals. 1915. (In abeyance 1915, 1916, 1917, 1918, 1920, and 1921—no Show held.)

4. LOGIEALMOND AND GLENALMOND.—*Convener*, Alexander Duncan, Drummond Park, Chapelhill, by Methven : *Secretary*, James E. Adamson, Schoolhouse, Logiealmond. 2 Medals. 1922.

Stirlingshire.

5. POLMONT.—*Convener*, William Ritchie, Millfield Dairy, Old Polmont ; *Secretary*, R. W. Copland, Kirkland Cottage, Polmont. 2 Medals. 1922.

FIRST EDITION.]

NOTE.—From 12th till 20th July all communications should be addressed to “The Secretary, Secretary’s Office, Showyard, Dumfries.”

*Address for Telegrams—“SOCIETY,” EDINBURGH.
Telephone No.—CENTRAL 3655.*

**HIGHLAND AND AGRICULTURAL SOCIETY
OF SCOTLAND**

**GENERAL SHOW OF STOCK AND IMPLEMENTS
DUMFRIES**

18TH, 19TH, 20TH, AND 21ST JULY 1922.

LAST DAYS OF ENTRY.

IMPLEMENTS AND OTHER ARTICLES—Monday, 15th May.

CATTLE, HORSES, SHEEP, PIGS, AND GOATS—Thursday, 1st June.

(Separate Form for EACH Entry.)

POULTRY, DAIRY PRODUCE, BEE APPLIANCES, HONEY, WOOL, RURAL INDUSTRIES, AND HORSE-SHOEING—Thursday, 1st June.

No Entry at ordinary fees taken later than those which are received at the Society’s Office, Edinburgh, by first post, or 10 o’clock, on Friday morning (2nd June). Late Entries for Cattle, Horses, Sheep, Goats, and Pigs taken on payment of 10s. additional for each entry (Poultry, Dairy Produce, Bee Appliances, Honey, Wool, Rural Industries, and Horse-shoeing at double fees) till Wednesday morning (7th June) at the Society’s Office, Edinburgh, at 10 o’clock.

President of the Society.

THE RIGHT HON. THE EARL OF STAIR, D.S.O.

Chairman of the Board of Directors.

SIR HUGH SHAW STEWART, BART., C.B.

Convenor of the Local Committee.

ROBERT F. DUDGEON, C.B., OF CARGEN, DUMFRIES.

The District connected with the Show comprises the Counties of Dumfries, Kirkcudbright, and Wigtown.

Highland & Agricultural Society of Scotland

PRIVILEGES OF MEMBERS

MEMBERS OF THE SOCIETY ARE ENTITLED—

1. To receive a free copy of the 'Transactions' annually.
2. To apply for District Premiums that may be offered.
3. To report Ploughing Matches for Medals that may be offered.
4. To Free Admission to the Shows of the Society.
5. To exhibit Live Stock and Implements at reduced rates.¹
6. To have Manures and Feeding-Stuffs analysed at reduced fees.
7. To have Seeds tested at reduced fees.
8. To have Insect Pests and Diseases affecting Farm Crops inquired into.
9. To attend and vote at General Meetings of the Society.
10. To vote for the Election of Directors, &c., &c.

ANALYSIS OF MANURES AND FEEDING-STUFFS.

The Fees of the Society's Chemist for Analyses made for Members of the Society shall, until further notice, be as follow:—

The estimation of one ingredient in a manure or feeding-stuff	5s.
The estimation of two or more ingredients in a manure or feeding-stuff	10s.

These charges apply only to analyses made for the sole and private use of Members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

The Society's Chemist, if requested, also supplies valuations of manures, according to the Society's scale of units.

SEEDS, CROP DISEASES, INSECT PESTS, &c.

The rates of charges for the examination of plants and seeds, crop diseases, insect pests, &c., will be had on application to the Secretary.

ELECTION OF MEMBERS

Candidates for admission to the Society must be proposed by a Member, and are elected at the half-yearly General Meetings in January and June. It is not necessary that the proposer should attend the Meeting.

CONDITIONS OF MEMBERSHIP

Higher Subscription.—The ordinary annual subscription is £1, 8s. 6d., and the ordinary subscription for life-membership is £12, 12s.; or after ten annual payments have been made, £7, 7s.

Lower Subscription.—Proprietors farming the whole of their own lands, whose rental on the Valuation Roll does not exceed £500 per annum, and all Tenant-Farmers, Secretaries or Treasurers of Local Agricultural Associations, Factors resident on Estates, Land Stewards, Foresters, Agricultural Implement Makers, and Veterinary Surgeons, none of them being also owners of land to an extent exceeding £500 per annum, and such other persons as, in respect of their official or other connection with Agriculture, the Board of Directors may consider eligible, are admitted on a subscription of 10s. annually, which may be redeemed by one payment of £7, 7s., and after eight annual payments of 10s. have been made, a Life Subscription may be purchased for £5, 5s., and after twelve such payments, for £3, 8s.² Subscriptions are payable on election, and afterwards annually in January.

Members are requested to send to the Secretary the names and addresses of Candidates they have to propose (stating whether the Candidates should be on the £1, 8s. 6d. or 10s. list).

JOHN STIRTON, *Secretary.*

3 GEORGE IV. BRIDGE, EDINBURGH.

¹ Firms are not admitted as Members; but if one partner of a firm becomes a Member, the firm is allowed to exhibit at Members' rates.

² Candidates claiming to be on the 10s. list must state under which of the above designations they are entitled to be placed on it.

REGULATIONS.

GENERAL CONDITIONS.

1. The Competition, except where otherwise stated in the Premium List, is open to Exhibitors from all parts of the United Kingdom.

2. Every Lot must be intimated by a Certificate of Entry, lodged with the Secretary *not later than Monday, 15th May, for Implements and other Articles, and Thursday, 1st June, for Stock, Poultry, and Dairy Produce, &c.* No Entry taken at ordinary fees later than those which are received at the Society's Office by first post, or 10 o'clock, on Friday morning, 2nd June. Late Entries for Cattle, Horses, Sheep, Goats, and Pigs taken on payment of 10s. additional for each entry (Poultry, Dairy Produce, Bee Appliances, Honey, and Wool at double fees) till Wednesday morning (7th June), at the Society's Office, Edinburgh, at 10 o'clock. Printed forms of Entry will be issued on application to the Secretary, No. 3 George IV. Bridge, Edinburgh. Admission Orders for Exhibits and Attendants will be forwarded to Exhibitors, by post, previous to the Show.

3. This Premium List is published and the Show will be held subject to any Orders that may be issued by the Board of Agriculture or Local Authorities. Any licences that may be required for the movement of Stock into or away from the Show must be obtained by Exhibitors. For these licences, application should be made to the Chief Constable, Kirkcudbright. *Licences for moving Stock.*

4. Animals suffering from any form of infectious or contagious disease—including ringworm or other form of infectious or contagious skin ailment—must not be brought to the Show. Those infringing this Rule shall be liable to a fine of 40s., and to have their Stock removed. *Diseased Animals.*

5. No Entry can be received or recorded unless it is accompanied by the necessary fees, and complies fully with the Regulations in the Premium List, the Secretary being empowered to return entries sent without the necessary fees. *Fees to accompany Entries.*

6. The Schedule of Entry must be filled up so far as within the knowledge of the Exhibitor. The Society shall have power at any time to call upon an Exhibitor to furnish proof of the correctness of any statement in his entry. *Particulars of Entries.*

7. The name of the Breeder, if known, must be given, and if the Breeder is not known, a declaration to that effect, signed by the Exhibitor, must be made on the Entry Schedule, and no pedigree will be entered in the Catalogue when the Breeder is unknown. *Name of Breeder.*

8. All animals, except calves, foals, and lambs shown with their dams must be entered in the classes applicable to them, and cannot be withdrawn after entry, or other animals be substituted in their place. *No substitution of Animals.*

9. For prizes given by the Society, no animal shall be allowed to compete in more than one class, or to compete in any class except that prescribed for animals of its pedigree and description; but this Rule does not apply to the Jumping and Harness Classes. *One Class only.*

10. All stock exhibited at the Show, except where otherwise stated in the Premium List, must be, at the time of entry, the *bona fide* property of the Exhibitor in whose name it is entered. *Ownership.*

11. Exhibitors are alone responsible for the accuracy and eligibility of their entries. The recording of an entry or the admission of the exhibit to the Showyard will not relieve the Exhibitor of this responsibility. The entry-fee paid for an animal entered in a class for which it is not eligible is not returnable. *Responsibility for Entries.*

Society not liable.

12. The Society shall not be liable for any loss or damage which Stock, Poultry, Dairy Produce, &c., Implements, or other articles may sustain at the Show, or in transit.

Disqualified Exhibitors.

13. The Society reserve to themselves the right of refusing, cancelling, or prohibiting the exhibition of entries from any person who, after 1st January 1904, has been expelled from the membership of any Agricultural or Dairy Society, or who may have been prohibited, suspended, or disqualified from making entries or exhibiting at the Show or Shows of any Agricultural or Dairy Society or Breed Society in consequence of having attempted to obtain a Prize by giving a false Certificate, or by other unfair means, or who is under exclusion from any Breed Society for fraudulent practices.

Animal Disqualified.

14. When an animal has previously been disqualified by the decision of any Agricultural or Breed Society in the United Kingdom, such disqualification shall attach, if the Exhibitor, being aware of the disqualification, fail to state it, and the grounds thereof, in his entry, to enable the Directors to judge of its validity.

Tampering with Animals.

15. Any artificial contrivance or device of any description found on or proved to have been used on an animal, either for preventing the flow of milk or for any other improper purpose, will disqualify that animal from being awarded a Premium, and the Owner of said animal may be prohibited from again entering Stock for any of the Society's General Shows, for such a period as the Directors may see fit.

Blindfolding Horses. Rejecting Entries.

16. Horses shall not be blindfolded while being shown in the Ring.

17. The Society further reserve to themselves the right of refusing any entries they may think fit to exclude, or to cancel any entry made, or to prohibit the exhibition of any entry.

Control of Exhibits.

18. Stock entered for competition, and actually in the Show, is subject to the control and under the orders of the Stewards, Secretary, and other Show officials of the Society, and such stock may not be withdrawn from competition without the consent of the Stewards or Secretary.

Improper Conduct.

19. Persons making insulting remarks to, or in any way unduly interfering with, the Judges, Stewards, or other officials while in the performance of their duties, and all Exhibitors or others in charge of stock while in the judging rings refusing to accept or display tickets, rosettes, &c., awarded by the Judges, and handed to them by the Stewards or other officials, or tearing up tickets, rosettes, &c., so awarded and handed to them, or indulging in any similar conduct, shall be considered guilty of misconduct, and shall be dealt with under these rules.

Subject to Orders.

20. All persons in charge of stock or other exhibits, and all persons admitted into the Showyard, shall be subject to the rules of the Society, and shall obey the orders of the Stewards, Secretary, and other officials of the Society. Exhibitors shall be answerable for the conduct of their servants or representatives.

Power of Officials. Protests.

21. The Stewards and other officials have power to enforce the regulations of the Society in their different departments.

22. A protest having reference to exhibits at the Show may be lodged by any person having interest. Protests having reference to competitions which take place on the first day of the Show must be lodged in writing with the Secretary at his Office in the Showyard not later than 9 A.M. on Wednesday, the second day of the Show, and parties must be in attendance at the Secretary's Office in the Showyard 9.30 A.M. that day, when protests may be disposed of. Protests relating to competitions taking place after the first day of the Show must be lodged before 5 P.M. on the day on which the particular exhibition takes place. Each protest must state specifically the grounds of objection, and must be accompanied by a deposit of £2, 2s., which deposit may, if the objection be proved frivolous to the satisfaction of the Directors, be forfeited. Protests may be lodged at any time by Directors.

and in this case no deposit will be required. Protests will be heard and determined by the Directors. Protests on veterinary grounds not received.

23. The violation of any one of the regulations, or disobedience of the orders of the Directors, Stewards, Secretary, or other officials of the Society, shall render the offending person liable to the forfeiture of all premiums awarded to him, or of such a portion as the Directors may ordain, and also liable to be expelled from the membership of the Society, and disqualified from again, or for a certain number of years, exhibiting at the Shows of the Society, or to have his case disposed of by fine or otherwise as the Directors may determine. *Penalties for Offences.*

24. The decision of the Directors shall, in every matter arising at or in connection with the Show, be final; and every person present at the Show, whether as a Judge, Exhibitor, Visitor, or otherwise, shall be deemed thereby to have agreed to refer the subject-matter of such decision to the final determination of the Directors to the exclusion of all Courts of Law. *Final Authority.*

25. All decisions under these rules may, along with the names and addresses of the persons against whom such decisions have been pronounced, be communicated by the Secretary of this Society to the Secretaries of all Agricultural or Dairy Societies holding open Shows in the United Kingdom, and to the Secretaries of all Breed Societies in the United Kingdom, and may be published in the Annual Reports of this Society, and in such newspapers or journals as the Directors may determine; and every Exhibitor competing at the Show, and every person present at the Show, whether as a Director, Member of Committee, Steward, Judge, Exhibitor, Visitor, or otherwise, shall be deemed thereby to have consented to such communication and publication. *Intimating Decisions.*

26. An animal to which a first Premium has been awarded, even if it should not qualify for that Premium, or an animal which subsequently becomes entitled to a first Premium, at a General Show of the Society, cannot again compete in the same class, notwithstanding any alteration in the heights stated for such class, but may be exhibited as Extra Stock. *Former Winners.*

27. Shorthorn, Aberdeen-Angus, Galloway, Highland, British Friesian, Red Poll, and Belted Galloway cattle must be entered in the herd-books—Ayrshire Cattle in the herd-book or any Appendices thereto—or the Exhibitor must produce evidence that his animal is eligible to be entered therein. *Herd-books.*

28. All Horses or Ponies entered in classes in which a particular height is stated shall, before being judged, be measured with their shoes on. No subsequent measuring or alteration of shoes will be permitted. *Height of Horses.*

29. Exhibitors of Hackney and Harness Horses shall be required to adhere to the Rules and Regulations of the Hackney Horse Society with regard to the weight of shoes on their exhibits, the Society's Veterinary Inspector being instructed to examine all the Hackneys and Harness Horses on the opening morning of the Show, and see that the following Rules as to the weight of shoes are attended to—viz., (a) For Hackneys exceeding 14 hands (except Hackney yearling colts and Hackney yearling fillies), no shoe (nails included) may exceed 2 lb. in weight; (b) for Ponies not exceeding 14 hands, Hackney yearling colts and Hackney yearling fillies, no shoe (nails included) may exceed 1½ lb. in weight. *Weight of Shoes.*

30. Breeding Stock must not be shown in an improper state of fatness, and the Judges are requested not to award Premiums to overfed animals; and no Cattle or Sheep which after the age of twelve months have been exhibited as Fat Stock at any Show are eligible to compete in the Breeding Classes for the Society's prizes. *Overfed.*

31. Aged Bulls and Stallions must have had produce, and, along with two-year-old Bulls, three-year-old Colts, and two-shear and aged Tups, have served within the twelve months immediately preceding the Show. *Sires.*

32. Except as may be otherwise specially provided in this Premium List, cows of all breeds (other than Ayrshire, British Friesian, and Red Poll) must *Calving of Cows.*

have had a calf within nine months previous to the Show, and when exhibited must be in milk. Cows of the Ayrshire, British Friesian, and Red Poll breeds must have had a calf within fifteen months previous to the Show. Animals of any age that have had a calf must be shown as Cows.

*In-calf
Heifers.*

33. Two-year-old Heifers of the Shorthorn, Aberdeen-Angus, Galloway, British Friesian, Red Poll, and Belted Galloway breeds, two-year-old Yeld Ayrshire Heifers, and three-year-old Highland Heifers, must be in calf when exhibited, and the Premiums will be withheld till birth be certified, which must be within nine months after the Show.

Mares.

34. A Mare entered in a class for "Mares with foal at foot" must have produced a foal after 1st January of the year of the Show, must have regularly nursed her own or another foal, and must have the foal with her in the Show. If the mare's own foal is alive it must be the foal shown with the mare. In the case of a Mare that has not foaled before the Show, or whose foal has died, she shall, if not in milk, be eligible without further entry to compete among the Yeld Mares if a corresponding class for Yeld Mares be included in the Premium List. Draught Yeld Mares must produce a foal within twelve months from the first day of the Show. A Mare in a class for "Mares or Geldings" may or may not have had a foal in the year of the Show, but shall not have her foal exhibited with her, nor be in milk at the time of the Show.

Sows.

35. All Sows farrowed prior to the year before the Show must have produced a litter of pigs in the year of the Show before the opening day. Sows farrowed in the year prior to the year of the Show must either have produced a litter of pigs before the Show, or produce a litter within three months of the last day of the Show. Certificates of the date of farrowing must be supplied in every case.

*Calves and
Foals.
Calving,
Farrowing,
and Foal-
ing Cer-
tificates.*

36. With reference to Regulation 33, birth of a live or full-time calf must be certified; and in regard to Regulation 34, birth of at least a nine months' foal; or in the case of the death of the dam, a Veterinary Surgeon's certificate must be produced certifying that at the time of death the animal was so far advanced with calf or foal that if it had lived it would have produced a calf or foal within the periods stated in Rules 33 and 34. Certificates required by the foregoing Regulations will be issued after the Show, and must reach the office of the Secretary as follows: calving certificates within ten months, farrowing certificates within four months, and foaling certificates within thirteen months, of the last day of the Show. In default of this, the animal will be regarded as having failed to fulfil the Regulations, and the prize will therefore pass to the animal next in order of merit or be forfeited.

*Special
Prizes.*

37. Except when otherwise provided, the awards of Special Prizes shall not be subject to the Regulations as to calving and foaling.

*Payment
of Prizes.*

38. The Premiums awarded, except those withheld till birth of calf or foal or litter of pigs is certified, will be paid as soon after the Show as practicable, and, with the exception of the Tweeddale Gold Medal, Special Cups, and Medals, may be taken either in money or in plate.

*Veterinary
Examina-
tion of
Stallions
and Colts.*

39. No Stallion or entire Colt, two years old or upwards, shall be allowed to compete for any of the Society's Prizes unless it has previously been licensed for stud purposes during the current year by the Board of Agriculture for Scotland, the Ministry of Agriculture and Fisheries, or the Irish Department of Agriculture.

*Soundness
of other
Horses.*

40. Judges are particularly requested to satisfy themselves, as far as possible, regarding the soundness of all Horses before awarding the Prizes, and to avoid giving Prizes to animals showing symptoms of hereditary disease. The Judges may consult the Society's Veterinary Surgeon if they deem it expedient. Private accommodation is provided for the examination of horses by the Veterinary Surgeon. No protests on veterinary grounds will be received.

*Accommo-
dation for
examina-
tion.*

41. Every Ewe must have given birth to and reared a lamb in the year of the Show; and Ewes of the Blackface and Cheviot breeds must be in milk, and have their lambs at foot. *Ewes.*

42. Animals in milk of the Dairy breeds must be milked dry at 6 o'clock on the evening previous to the opening of the Show in the presence of, and to the satisfaction of, the Steward of Cattle or a representative of the Society duly authorised by him. Animals arriving after six o'clock will be milked dry at the time of arrival. *Milking.*

43. Sheep must have been clipt bare after the first day of the November preceding the Show, no part of the animal to be clipt prior to that date—this Rule not to apply to Cheviot Sheep. *Clipping.*

No Blackface Sheep shall be eligible which has not been clipt bare on or after the 1st April of the year of the Show.

44. The Steward of Sheep, who can call in assistance if so desired by him, shall have full power to disqualify any pen of Blackface, Cheviot, Border Leicester, and Half-bred Sheep which he considers unnaturally coloured, or when the fleece, face, or legs have been dealt with by the use of foreign substances. *Colouring, &c., of Sheep.*

45. All Oxford Down and Suffolk Sheep shown must be entered or eligible for entry in the Oxford Down and Suffolk Flock Books respectively. *Flock Books.*

46. In Poultry the Aged Birds must have been hatched previous to, and Cockerels and Pullets in, the year of the Show. *Poultry.*

47. Railway Certificates for Stock are issued to Exhibitors before the Show along with their Tickets of Admission, one Certificate for the outward and another for the return journey being sufficient for each Exhibitor for any number of exhibits (see page 79). *Railway Passes.*

48. Poultry and Stock will be admitted on Monday, the day before the opening of the Show, and, with the exception of Horses, must be in the Yard before 12 o'clock that night. Horses must be in before 8 o'clock on the morning of Tuesday, except those entered in classes for which other times for arrival are elsewhere stated in this List. Judging begins at 9.30 A.M. on Tuesday. Exhibited on Tuesday, Wednesday, Thursday, and Friday. Stock may be admitted on the Saturday preceding the Show, but only by sending two days' prior notice to the Secretary's Office in the Showyard. *Admission of Stock.*

49. Horses and Cattle must be paraded at the times stated in the Programme of the Show, and when required by the Stewards, and under their direction. Females of the Highland Cattle breed will, on this occasion, be paraded at the option of the exhibitor. In Parade, Horses must be ridden or led as provided in their respective classes. Prize and commended Cattle and Horses will receive two rosettes each, which must be attached to the head of the animal, one on each side. Attendants must be beside their animals *twenty minutes before the hour of Parade*, and be ready to proceed to the ring immediately on receiving the order of the Stewards. Infringement of this Rule, or failure of any attendant to obey the orders of the Society's officials, will render the Exhibitor liable to a fine of 20s. for each separate infringement or act of disobedience, and to the forfeiture of any or all of the Prizes awarded to him at this Show. *Parades.*

50. Exhibitors shall be answerable for all acts, whether committed by themselves, their servants, or others in charge of their Stock, and shall be responsible for the condition of their animals during the whole time they remain in the Showyard. *Responsibility of Exhibitors.*

51. No animal shall be taken out of its stall after 10 A.M. during the Show except by order of the Stewards, or with permission of the Secretary. *Moving from stalls.*

52. Cattle shall not be taken out of their stalls to be washed after the Judging has commenced. Cattle must not be washed beside the Judging Rings. Those infringing this Rule shall be liable to a fine of 10s. *Washing Cattle.*

53. Soap or other adhesive material must not be used in dressing cattle or horses. Infringement of this Rule will render the animal upon which the material is used liable to be disqualified. *Soaping prohibited.*

- Loose-boxes and Stalls.* 54. Loose-boxes will be provided for all horses; covered accommodation for other live stock. Stalls for nurse cows charged at ordinary rates. Boxes (floored) for attendants on Cattle, Horses, Sheep, Goats, and Pigs will be provided at a charge of 40s. for each box for members; 50s. for non-members. (See Rule 79.)
- Floored boxes and stalls for Animals.* 55. Exhibitors requiring the boxes, stalls, or pens for their animals to be floored must give instructions, stating the Catalogue No., to the Society's Showyard Erector, Mr John Reid, Showyard, ten days before the Show opens. (For charges, see Rule 78.)
- Securing Cattle.* 56. Bulls must be secured by nose-rings, with chains or ropes attached, or with strong halters and double ropes. All Cattle, other than Highland Cattle, must be tied in their stalls.
- Concealing Animals.* 57. During the time the Show is open to the public no rug shall be hung up so as to conceal any animal in a horse-box or stall, except with the special permission of the Steward of that department.
- Fodder.* 58. Five days' supply of straw, hay, grass, and tares will be provided free by the Society. Any additional fodder or other kinds of food required will be supplied at fixed prices in the Forage-yard. The Forage-yard will close at 1.30 p.m. on Friday, the last supply to be given to attendants then; and if any extra supply is required on account of stock remaining in the Yard after the close of the Show, notice must be given to the Forage Steward not later than 5 o'clock on Thursday. Any servant removing bedding from an adjoining stall will be fined in double the amount taken. Exhibitors may fetch their own cake or corn to the Yard, but not *grass, tares, hay, or straw*. Coops, food, and attendance for Poultry will be provided by the Society.
- Feeding appliances.* 59. Servants in charge of Stock must bring their own buckets or pails, and a piece of rope or sheep-net to carry their forage. Mangers, and sheep and pig troughs, will be provided.
- Sawdust.* 60. Sawdust must not be used as bedding for Stock.
- Water.* 61. As the command of water in the Yard is limited, it is particularly requested that waste be avoided.
- Lights and Smoking.* 62. No lights allowed in the Yard at night, and Smoking is strictly prohibited within the Sheds. Those infringing this Rule shall be liable to a fine of 10s. The gates will be closed at midnight, and no person shall be allowed to enter or leave the Yard between that time and 5 a.m. without a special permit.
- Closing of Gates.* 63. Stock or Poultry cannot be removed from the Yard till 5 p.m. on Friday, the last day of the Show, except on certificate by the Veterinary Surgeon employed by the Directors, countersigned by the Steward of the department or the Secretary.
- Removal of Stock.* 64. At the close of the Show on Tuesday, Wednesday, and Thursday, horses may be withdrawn for the night on a deposit of £5 for each animal, which shall be forfeited, along with any prize money it may have gained, if the animal is not brought back. They must return between 7 and 7.30 the following morning, and those not in before 8 shall forfeit 10s. Horse passes to be applied for at the Secretary's Office between 5 and 6 p.m. on Tuesday, and the deposit, unless forfeited in whole or in part, will be returned between 12.30 and 2.30 on Friday.
- Withdrawal of horses over night.* 65. When the Stock is leaving the Yard, no animal is to be moved till ordered by those in charge of clearing the Yard. Those transgressing this Rule shall be liable to a fine of 10s., and to be detained till all the other Stock is removed.
- Order in removal.* 66. Poultry may be penned before the opening and removed at the close of the Show by Exhibitors themselves or their representatives. In the event of neither the Exhibitor nor an authorised representative of the Exhibitor being present to pen or remove Poultry, the birds will be penned and removed by men hired and paid by the Society, but this will be done on the understanding that the men are hired to do the work on
- Penning and removing Poultry.*

behalf of Exhibitors, and solely at their risk, and that the Society will be in no way responsible for expenses incurred or loss of or injury to Exhibits by errors or accidents in penning, despatching, or conveying Exhibits.

67. On the opening day of the Show the Poultry Shed will be closed to the public during the Judging. On the last day of the Show the Poultry Shed will be closed to the public at 4 p.m.; at 5 p.m. Exhibitors or their representatives will be admitted to the Shed to remove Exhibits, provided the Exhibitor has, *not later than 11 a.m. on the last day of the Show*, given written notice to the Secretary to the effect that the Exhibitor or the Exhibitor's representative will attend at the Poultry Shed at 5 p.m. to remove the birds.

Closing of Poultry Shed to Public.

JUDGING STOCK AND POULTRY.

68. On Tuesday, the first day of the Show, no person will be admitted, except Servants in charge of Stock, till 8 a.m., when the Gates are opened to the public.

Opening Gates.

69. The Judges will commence their inspection at 9.30 a.m. The spaces reserved for the Judging will be enclosed, and no encroachment shall be permitted.

Judging.

70. In no case shall a Premium be awarded unless the Judges deem the animals to have sufficient merit; and where only one or two lots are presented in a class, and the Judges consider them unworthy of the Premiums offered, it shall be in their power to award a lower prize.

Insufficient merit.

71. In addition to the Premiums, the Judges may award **one** Very Highly Commended, **one** Highly Commended, and as many Commended tickets in each class as they consider justified by the number and merit of the entries.

Commendations.

72. Ayrshire, British Friesian, and Red Poll Cows which have not calved before the Show, whether entered in a class for Cows in Milk or for Cows in Calf, shall be judged along with the Cows in Calf, and Ayrshire, British Friesian, and Red Poll Cows or Heifers which have calved before the Show—in whichever of the classes entered—shall be judged along with Cows in Milk.

Ayrshire, British Friesian, and Red Poll Cows and Heifers.

73. Attending Members will accompany each section of the Judges. It will be the duty of Attending Members to bring the animals out to the Judges and to see that no obstruction is offered to them, and that the space reserved for them is not encroached upon; to ticket the prize animals; to send the Nos. of the prize animals to the Award Lectern near the Secretary's Office; to assist the Judges in completing their return of awards; and should any difficulty arise, to communicate with the Stewards or Secretary.

Attending Members' duties.

74. It shall not be competent for any Exhibitor, nor for his Factor or Land-Steward, to act as a Judge or attending Member in any class in which he is competing.

DAIRY PRODUCE.

75. Dairy Produce will be received in the Showyard on Monday, the day before the opening of the Show, and till 8 a.m. on Tuesday, the first day of the Show. Judged at 9.30 a.m. on Tuesday. Exhibited Tuesday, Wednesday, Thursday, and Friday.

76. Dairy Produce must have been made on the Exhibitor's farm in the year of the Show. No Exhibitor shall show more than **one** lot in each class. Exhibits of Dairy Produce may be placed before the opening and removed at the close of the Show by Exhibitors themselves or their representatives. In the event of neither the Exhibitor nor a person with written authority from the Exhibitor being present to place or remove exhibits, they will be placed and removed by men hired and paid by the Society, but this will be done on the understanding that the men are

Placing and removing Dairy Produce.

hired to do the work on behalf of Exhibitors, and solely at their risk, and that the Society will be in no way responsible for expenses incurred or loss of or injury to exhibits by errors or accidents in placing, despatching, or conveying exhibits. In the case of exhibits which are not removed by 5.30 P.M. on the closing day of the Show, the Society will hold itself at liberty to hand them over to the railway companies for despatch to the respective Exhibitors.

STALL RENT (INCLUDING ENTRY FEE).

Stall Rent. 77. The Stall Rents (which include Entry Fees) as stated opposite the individual Classes in this List, shall be paid by Exhibitors when making their Entries. The Secretary is instructed to return entries sent without the necessary fees.

FLOORED BOXES AND STALLS.

Floored Stalls for Animals. 78. Exhibitors desiring the boxes, stalls, or pens for their animals to be floored can have this done by giving instructions, stating the Catalogue No., ten days before the opening of the Show, to the Society's Showyard Erector (Mr John Reid, Showyard), to whom the following charges for flooring have to be paid : Horses, 30s. each ; Ponies, Cattle, Sheep, and Pigs, 20s. each.

ACCOMMODATION FOR ATTENDANTS.

Accommodation for Attendants. 79. Boxes for accommodation of attendants on Stock will, if desired, be provided beside the Stock at a charge of 40s. per box for members and 50s. for non-members. Attendants' boxes will be floored and lined with wood, with door. Applications for attendants' boxes must accompany entries of Stock, and Exhibitors must state the animal next to which the attendants' box is to be placed. Attendants' boxes cannot be guaranteed after the closing date.

IMPLEMENTS AND OTHER ARTICLES.

Admission of Goods. 80. Implements will be received in the Yard from Tuesday, 11th July, till 5 o'clock on the afternoon of Monday, 17th July. Exhibited Tuesday, Wednesday, Thursday, and Friday. The Schedule of Entry must be filled up so far as within the knowledge of the Exhibitor, and prices must be stated.

Premiums. 81. No Money Prizes or Medals, except when specially offered, will be given by the Society for Implements of any kind.

Refusing Entries. 82. Agricultural Implements, and Implements and collections, of articles not Agricultural, will be received for Exhibition, but the Secretary is entitled to refuse Entries from dealers in articles not deemed worthy of Exhibition.

Local Operatives. 83. In order to encourage exhibits of Agricultural Implements from operative Blacksmiths and Carpenters in the district of the Show, open space will be provided for these in some less prominent part of the Yard at a charge of 20s. for space 10 feet wide and 20 feet deep.

Articles not entered. 84. Every article to be exhibited must be entered on the Society's Entry Form. Any article not so entered that is taken to the Show is liable to be ordered out of, or removed from, the Showyard, or confiscated to the Society. Exhibitors infringing this rule are moreover liable to a fine of £1.

85. "Cheap-Jacks" are not admitted to the Showyard. The selling of goods by auction, shouting, and other behaviour calculated to annoy visitors or Exhibitors, are strictly forbidden. Exhibitors infringing this Regulation are liable to a fine of £1, and to have themselves and their goods ordered out of, or removed from, the Showyard, or to have their goods confiscated to the Society. *Selling by auction and noisy behaviour forbidden.*

86. The articles of each Exhibitor must all be placed in one stand, except Implements in motion, and must not on any account extend beyond the allotted space. No article shall be moved out of its stand, or the stand dismantled, till the termination of the Show, at 5 P.M. on Friday. Those infringing this Rule shall be liable to a fine of 10s. *Placing Exhibits. Removing Exhibits.*

87. When the ground requires to be broken, the turf must be carefully lifted and laid aside, and the surface must be restored to the satisfaction of the Society, and at the expense of the Exhibitor. Failing this being done, the Society shall be at liberty to restore the ground and charge the cost to the Exhibitor. *Restoring Turf.*

88. Exhibitors must arrange their own articles *within* the space allotted to them before 9 o'clock on Tuesday, and to the satisfaction of the Stewards in charge of the Implement Yard. Exhibitors are prohibited from subletting space allotted to them, and from displaying the name of any other firm on their Stand. All signs, except signs on gables, must face the front only. Nails must not be driven into the canvas. *Arranging Exhibits. Signs.*

89. Exhibitors are not allowed to distribute handbills anywhere in the Yard except at their own Stand; and they must not for this or any other purpose encroach upon the adjacent alleys or open spaces. *Handbills.*

90. Exhibitors are required to have their Stands and the portions of the alleys immediately adjoining them swept up before eight o'clock on each morning of the Show. *Sweeping Stands, &c.*

91. All Machines requiring steam or fire must be entered as such in the Certificate, and will be placed in the Motion Yard. *Coke only shall be used in all cases where fire is required.* Coal shall not be used at any time in the Showyard. Those infringing this Rule shall incur a penalty of £5. *Fuel.*

92. No Steam Engine shall be driven in the Yard at a greater speed than 4 miles an hour. Traction Engines shall not be used in conveying Exhibits or other goods from one place to another in the Showyard. *Steam Engines.*

93. Locomotive and Traction Engines and other Machines must not be moved from their places without permission of the Secretary or Stewards, and must not leave their stands till 6 P.M. on Friday. *Traction Engines.*

94. There must be attached to each Implement, when forwarded to the Show, a label bearing the Exhibitor's name, and that of the Implement, as well as the number of the Exhibitor's stand. *Consigning Implements.*

95. The carriage of all Implements must be prepaid.

96. Photographing in the Showyard is not permitted, except by photographers having a Stand in the Showyard or holding a "Photographer's Ticket." The "Photographer's Ticket" may be had from the Secretary, price 20s. It admits the holder to the Show when open to the public, and entitles him to photograph in the Showyard, subject to arrangements made by the Stewards. No photographer shall be allowed in the ring during Parades, except with the sanction of the Steward of Parades. *Photographing in Showyard.*

97. Covered Booths for Offices (9 feet by 9 feet), purely for business, not for exhibition of goods, can be had for £6 to Members and £8 to Non-Members. *Offices.*

98. Each Exhibitor in the Implement Department who is not a Member of the Society will receive one free Ticket of Admission to the Showyard for himself or a member of his firm, and will receive, in addition, for the use of attendants employed by him at his Stand, two Tickets of Admission for each complete ten feet of shedding in the *Exhibitors and Attendants' Tickets.*

Motion Yard, and one Ticket for each complete ten feet of shedding in the other sections. No additional Free Tickets can be issued in any circumstances whatever. Additional Attendants' Tickets, not more than five for one Exhibitor, may be obtained by application in writing by the Exhibitor at 5s. each. *No tickets will be issued without an Order.*

Tickets to be filled up and signed.

99. The Tickets of Admission for Exhibitors and Attendants referred to in the foregoing Regulation will (about fourteen days prior to the Show) be issued to the Exhibitors in blank, with the number of the Exhibitor's Stand. The name of the person for whom each ticket is intended must be written on it before it is used. Each person holding a Free Ticket of Admission must sign his or her name on the back thereof, and must also, when required, sign his or her name in the book at the Entrance Gate. Exhibitors' attendants are strictly cautioned not to lend or transfer their Tickets, which can be used only by the persons whose names they bear, and who must be *bona fide* acting for, or employed by, the Exhibitor. No Ticket is transferable. An Exhibitor is liable to a fine of £1 for each case of transfer or other improper use of a Ticket issued to himself or employee.

Tickets not Transferable.

Improper use of Tickets.

Admission of Supplies for Stand-holders.

100. The following are the arrangements for the admission of Supplies (Refreshments or other goods) for Stand-holders during the Show: Messenger on foot (with or without hand-barrow) with supplies, admitted by Special Ticket; price for one admission, 2s., for the four days, 6s. Horse vehicle and driver with supplies, admitted by Special Ticket; price for one admission, 2s., for the four days, 10s. These Special Tickets may be had from the Secretary. Horse vehicles, with supplies, admitted throughout the day on the first day of the Show; on the other three days they will not be admitted between the hours of 10 A.M. and 5 P.M. except by written permit from the Secretary.

Cycles.

Accidents.

101. The riding of Cycles in the Showyard is prohibited.

102. The Society will not be responsible for any accident that may occur from the machinery belonging to any Exhibitor; and it is a condition of entry that each Exhibitor shall hold the Society harmless, and indemnify it against any legal proceedings arising from any accident caused by his machinery.

Alcoholic Drinks.

Gas.

103. The giving of Alcoholic Drinks to visitors at Stands in the Show is strictly prohibited.

104. Exhibitors desiring the use of gas in the Showyard should apply to the Manager of the Corporation Gas Works, Dumfries, not later than Saturday, 10th June.

Space for Stands.

105. * Ground to be taken in spaces of 10 feet frontage by 20 feet deep, except in Motion Yard, which is to be 10 feet or larger amount of frontage by 50 feet deep. Exhibitors must take their space in one or other of the following Sections. Space is not let partly covered and partly open. Exhibits not in motion may be excluded from the Motion Yard. The space in the Motion Yard being limited in extent, and intended mainly for exhibits in motion, not more than one-fifth of the space allotted to any one Exhibitor—and in no case more than 400 square feet—may be occupied in the Motion Yard by exhibits not in motion.

Exhibits not in Motion.

Maximum Space.

106. The maximum extent of space which any one Exhibitor may apply for shall be 40 feet of frontage in the Motion Yard, and 100 feet of frontage in the other Sections.

Allocation of space.

107. The Society reserves the right to allot to applicants for Stands either the whole or part of the space they ask for.

108. Exhibitors requiring work executed in connection with the fitting up of stands allotted to them must employ the Society's Showyard Erector—Mr John Reid, 55 Blenheim Place, Aberdeen. The execution of orders received later than one week before the opening of the Show cannot be guaranteed.

* Special provision may be made for Exhibitors of both machinery in motion and implements and machinery not in motion on application being made to the Secretary.

109. Rates for space, payable by Exhibitors when making their Entries :—

	Members.	Non-Members.
1. Open ground without Shedding, 20 ft. deep, per 10 ft.	£1 10 0	£2 10 0
2. Special open ground, without Shedding, 20 ft. deep, per 10 ft.	3 0 0	4 0 0
3. Ordinary Shedding, 20 ft. deep, 7 ft. to eave, per 10 ft.	2 0 0	3 0 0
4. Special Shedding, 20 ft. deep, 7 ft. to eave, per 10 ft.	3 10 0	4 10 0
5. Ordinary Shedding, 20 ft. deep, 7 ft. to eave, <i>close boarded at back</i> , per 10 ft.	3 0 0	4 0 0
6. Special Shedding, 20 ft. deep, 7 ft. to eave, <i>close boarded at back</i> , per 10 ft.	4 10 0	5 10 0
7. *Motion Yard, without Shedding, 50 ft. deep, per ft.	0 8 0	0 14 0
8. *Motion Yard, with Shedding (10 ft. open behind, 20 ft. covered, and 20 ft. <i>open in front</i>), 11 ft. to eave, per foot	0 12 0	0 18 0
9. Covered Booths for offices, 9 ft. by 9 ft., each	6 0 0	8 0 0
10. Press offices, 9 ft. by 9 ft., each	£4.	

* See Rules 105 and 106.

NEW IMPLEMENTS.

1. An Exhibitor who desires to enter a "New Implement" for competition for the Society's Silver Medal must enter it separately as a "New Implement" at the commencement of the specification of his proposed exhibits; and he must define clearly, on a special form obtainable from the Secretary, the exact nature of the novelty which qualifies such implement to be entered for a Medal. Unless the "New Implement" be properly described in the specification, and particulars of its novelty are given at the time of making the entry, it will not be accepted.

2. For each entry of a "New Implement," sent with an application for space, made in accordance with Regulation 109, a non-returnable Entry Fee of £1 will be charged. Late entries of "New Implements" *only* will, however, be considered up to 9th June, provided that no increase of space beyond that originally allotted to the Exhibitor will be occasioned by such New Implements being shown at his stand.

3. In cases of sufficient merit, the Judges will recommend the award of the Society's Silver Medal to New Implements for agricultural or estate purposes, or to new improvements in such implements. No award shall be made without such trial as may be approved by the Directors.

4. The Society does not bind itself to try in the field every "New Implement" entered for a Silver Medal. Any Exhibitor who expresses a wish to do so can, with the sanction of the Steward of Implements, at his own expense take his New Implement out of the Showyard during the Show week and put it to work, and if within a reasonable distance, the Judges will, if they deem it necessary, inspect it at work and decide if it is worthy of a Silver Medal.

5. No Silver Medals will be awarded to, nor can any entry as New Implements be accepted of, machines of any class for which competitive trials have been announced by the Society as about to take place.

6. The Judges of New Implements will commence their inspection at 2.30 P.M. on Tuesday, 18th July, and will take in rotation the stands of the exhibitors who have entered New Implements for the Society's Silver Medals. A notice will be posted at the Secretary's Office each evening giving the number of the stand at which the Judges will commence their inspection next morning. Each Exhibitor, or his representative, will be expected to be at the stand to explain the working of the Implement to the Judges. If the exhibit be not ready and in working order by the time the Judges make their inspection, it is liable to be struck off the list.

7. All publications by exhibitors of the award of the Society's Silver Medals must state the year of the award, and must specify the exact nature of the "New Implement," of the improvement, or of the attachment to an Implement, for which the Silver Medal has been awarded.

8. On the recommendation of the Judges, with the approval of the Directors, any New Implement of merit, which cannot be sufficiently tried, or which is capable of further development, may be entered and exhibited as a "New Implement" at the succeeding Show of the Society.

9. The Judges' decision, when duly accepted and recorded, will in all cases be final.

RESERVED SEATS (NUMBERED) IN GRAND STAND.

*For Charges and Tickets, apply to Secretary.
Booking-Office in Showyard behind Grand Stand.*

ADMISSION OF THE PUBLIC.

The public will be admitted daily at 8 A.M. Judging begins on Tuesday at 9.30 A.M. The charges for admission to the Yard will be—Tuesday, from 8 A.M. till 5 P.M., 7s. 6d. Wednesday, from 8 A.M. till 5 P.M., 5s.; Thursday, from 8 A.M. till 5 P.M., 2s. 6d.; from 5 P.M. till 8 P.M., 1s. Friday, from 8 A.M. till 5 P.M., 1s.

On Thursday and Friday children under twelve years of age admitted at 6d.

No Pass-out Checks given, and no re-admission without payment.
Season Tickets—15s. each.

ADMISSION OF MEMBERS AND EXHIBITORS.

On exhibiting their "*Member's Badge*," which is strictly not transferable, Members of the Society are admitted free to the Showyard. Badges will be sent to all Members residing in the United Kingdom whose addresses are known, and on no account will duplicates be issued. All Members not producing their badges must pay at the gates, and the admission money will not on any account be returned. Badges must be signed by Members before being presented at the gate, and Members should continue to wear the badge during the whole time that they are in the Showyard.

Tickets of admission to the Showyard are sent to Exhibitors of Stock, Poultry, and Dairy Produce (not Members) whose Entry Fees amount to not less than 20s.

For Exhibitors of Implements and their assistants tickets are issued as provided in the Regulations for Implements.

VARIOUS.

Exhibitors may display their own Placards *inside and in front* of their stands; with this exception, no Bills of any kind other than those of the Society are permitted on any of the Show erections. No newspapers or any other articles to be carried about the Yard for sale or display.

No Carriages or Equestrians admitted without special leave from the Directors, and then only for Invalids. Bath-chairs may be brought in.

Premium Lists, Regulations, and Certificates of Entry may be obtained by applying at the Secretary's Office, No. 3 George IV. Bridge, Edinburgh.

All Communications should be addressed to The Secretary of the Highland and Agricultural Society of Scotland, No. 3 George IV. Bridge, Edinburgh. From 12th to 20th July, to the Secretary's Office, Showyard, Dumfries.

*Address for Telegrams—"SOCIETY," EDINBURGH.
Telephone No.—CENTRAL 3655.*

RAILWAY ARRANGEMENTS.

The Railway Companies will be furnished with a list of the Exhibitors of Stock and Implements, after the 27th June. All applications for horse-boxes and trucks, and for information as to train arrangements, must be made by the Exhibitors themselves to the Stationmaster where their stock is to be trucked.

The arrangements made by the Railway Companies for the conveyance of Live Stock and Goods to and from the Show are indicated below, but exhibitors are recommended to apply to the respective companies for full particulars:—

1. Live Stock and Goods to the Show to be charged ordinary rates.
2. Live Stock and Goods *from* the Show, if sold, to be charged ordinary rates.
3. Live Stock from the Show, if unsold, and returned not later than the second day after the closing day of the Show (excluding Sunday), to be carried at half rates back to the Station whence the animals were sent, and by same route, at owner's risk, on surrender of a certificate from the exhibitor to the effect that they are really unsold; failing surrender of such certificate, ordinary rates will be charged.
4. Poultry to be charged ordinary rates both ways, and will not be accepted for conveyance unless the carriage charges are prepaid.
5. Horse-boxes, or other Passenger Train vehicle, will not be provided for the carriage of Live Stock sent by Goods Train and invoiced at Goods Train rates. *For rates for Horse-boxes by Passenger and Special Trains, apply to the Railway Companies.*

6. Provender conveyed to and from Agricultural Shows with Live Stock will be charged at the applicable rates, subject to a free weight allowance, viz.—

Cattle	per animal, 56 lb.
Horses	56 "
Sheep, goats, lambs, pigs, and calves	28 "

7. The carriage of all Live Stock, Implements, and other articles going to the Show for exhibition must be PREPAID; and the carriage on all traffic *returned from the Show by Passenger Train Service must be PREPAID.*

The carriage charges on Live Stock conveyed in special vehicles by Passenger Train and intended to be returned to the original sending Station may also be prepaid for the return journey at the original sending Station if the owner so desires.

The Railway Charge on all exhibits which are conveyed by Passenger Train in the Guard's Van and intended to be returned from the Show direct to the original sending Station by the same route must be PREPAID, for both the outward and return journeys, at the original sending Station. The agreed form of address label for Poultry, Dairy Produce, Bee Appliances, and Wool exhibits, which will be supplied through the Secretary of the Society, must be used in such cases.

8. Attendants in charge of Live Stock are conveyed free in the cases shown below, when certified by the owners to be *bona fide* in charge of such Live Stock:—

In Horse-Boxes.—Horses and Cattle: One man for each consignment, except where the consignment requires more than one vehicle, when one man to each vehicle may be sent free; but where two or three Horses or Cattle forming one consignment are sent in the same Horse-box and a man is required to travel with each animal, a man for each animal may be conveyed free, provided each animal is charged for separately.

In Horse-Boxes.—Small animals: One man to each vehicle.

In specially constructed Cattle Trucks.—Cattle or other animals: One man to each vehicle.

9. Agricultural Machines, Implements, and other Exhibits from the Show, *if unsold*, to be conveyed at half rates back to the Station whence they were sent, at Owner's risk, on production of a Certificate from the Exhibitor to the effect that they are unsold; failing production of such Certificate, ordinary rates must be charged. The reduction to half rates is to be allowed only when the articles are returned by the same route as that by which they were conveyed to the Show, but it shall be in the option of the Railway Company or Companies to return the articles at half rates by a different route.

10. Unsold goods, previously carried by railway, transferred from one Agricultural Show to another, in another part of the country, or exhibited at several Shows consecutively, and returned to the Station from whence originally sent, will be conveyed at half rates at Owner's risk, on production of Certificate from the Exhibitor to the effect that they are unsold; failing production of such Certificate, ordinary rates will be charged. This applies only to Goods Trains.

11. The ordinary rates charged for carriage do not in any case include delivery *to*, or collection *from*, the Show-ground.

12. Agricultural Societies' Show Plant must be charged at Class C rates, station to station.

13. Tents, Canvas, and other articles, not for exhibition, to be charged the ordinary rates both going and returning.

14. Carriages and other Road Vehicles are only conveyed by Passenger Train when this can be conveniently done.

DELIVERY AND COLLECTION CHARGES.

The following will be the Charges for the Delivery or Collection of Live Stock, Implements, and other articles between the Railway Station at Dumfries and Maxwelltown and the Show-ground:—

General traffic, 6s. 9d. per ton (minimum charge per consignment, 2s. 3d.)

Implements and Machinery (Agricultural), not exceeding 1 ton each,

7s. 9d. per ton (minimum charge per delivery, 3s. 6d.)

Implements and Machinery (Agricultural), on their own wheels (specially hauled), not exceeding 1 ton, 7s. 9d. each.

When hauled on their own wheels behind a lorry, loaded or partly loaded with other goods, actual weight to be charged at 7s. 9d. per ton.

Single articles, exceeding 1 ton but not exceeding 3 tons, 9s. per ton.

Single articles, exceeding 3 tons but not exceeding 5 tons, 12s. 6d. per ton.

Single articles, exceeding 5 tons, by special arrangement only, but no less charge than 16s. 3d. per ton.

Rustic Houses, by special arrangement only, but no less charge than 14s. 6d. per load.

Carriages, four-wheeled, 9s. each.

Carriages, two-wheeled, 7s. 3d. each.

Cattle, in floats, 6s. 9d. per head; minimum charge, 9s.

Sheep, Goats, and Pigs, in floats, 1s. 9d. per head (minimum charge, 9s. for each consignment).

Pigs in crates, 3s. 6d. per crate (minimum, 6s. 9d. per load).

*Poultry in crates or hampers, 9d. per crate or hamper.

Ordinary Parcels by Passenger Train, 6d. each.

Miscellaneous Passenger Train Traffic, including packages of plants and flowers, carried at O.R. rates S. to S., 9d. per cwt. (minimum, 1s. 6d. per consignment).

* Poultry exhibits only will be conveyed at the Society's expense from the Railway Station to the Showyard and back, but no exhibit subject to railway charges will be received by the Society. All other delivery charges must be paid by the Exhibitor.

REGULATIONS FOR GOAT CLASSES.

The animals will be milked dry at 6 o'clock on the evening previous to the opening of the Show, in the presence of, and to the satisfaction of, the Steward or a representative of the Society duly authorised by him.

Kids must be entered in the Kid Register of the British Goat Society. Goatlings must be entered either in the Kid Register or the Show Register, whilst all other Goats must be entered in either of these Registers or the Herd-Book before being exhibited at this Show.

MILKING COMPETITION—CLASS 130.

The animals will be milked at 5 P.M. on Tuesday, 18th July, at an appointed place in the order arranged by the Steward, and the milk of the next twenty-four hours will be taken for the trials. The hours of milking shall be 8 A.M. and 5 P.M. on Wednesday, 19th July.

All Goats must have kidded within twelve months of the first day of the Show.

The prizes will be awarded according to the following scale of points:—

For each pound of milk 1 point.

For each 6 days the Goat has been in milk (deducting the first forty days after kidding), with a maximum of 6 points $\frac{1}{6}$ of a point.

For each $\frac{1}{4}$ lb. of fat in the milk 5 points.

For each $\frac{1}{4}$ lb. of solids, other than fat, in the milk . . . 1 point.

In cases where the milk contains less than 3 per cent of fat 1 point will be deducted.

The period of lactation to be calculated from the date of kidding to the first day of the Show. No prize will be awarded to a goat giving less than 4 lb. of milk per day.

Fractions of lbs. of milk, percentage of fat, and of solids other than fat, to be worked out in decimals and added to the total points.

A Certificate giving the last date of kidding, signed by the owner of the Goat exhibited, or his Agent, must in every case be brought to the Steward of Goats as soon as possible after the animal has arrived in the Showyard.

The milk yielded by Goats in the Showyard shall be the property of the Society.

BEE APPLIANCES AND HONEY, &c.

RULES AND REGULATIONS.

1. All exhibits must be despatched in time to be delivered at the Showyard not later than 6 P.M. on Monday, 17th July. According to railway regulations, exhibitors will require to pay return carriage when despatching. Return carriage-paid labels will be supplied by the Secretary. Non-compliance with this regulation will mean that the exhibit will be left in the Showyard. Boxes containing hives, jars, or sections must be *screwed* and not nailed, and the hives, bottles, and sections so placed that they can be lifted out and replaced without disturbing the packing.

2. The number of the exhibit will be sent by the Secretary (as entered on the admission ticket), and must be placed on every exhibit and on each detachable part of exhibit—viz., on the several parts of each Hive, on every jar of Extracted Honey. The number must be gummed on the jar and not on the bottom or cap. No goods will be allowed to be staged unless this rule is complied with.

3. No card, trade mark, or name of the exhibitor may be placed upon any part of an exhibit. Every article exhibited must be the property of the exhibitor, and all honey must have been gathered in the natural way within the United Kingdom, by bees the property of the exhibitor.

4. Comb Honey must be glazed on both sides, to protect the honey from injury. If paper edging is used, it must be of such a width as to leave $3\frac{1}{2}$ inches by $3\frac{1}{2}$ inches of glass clear of the lace paper, or in any other neat way capable of easy removal by the judges, in small boxes glazed on both sides, such as supplied by dealers.

5. All Run Honey or Extracted Honey and Granulated Honey must be shown in Glass Jars holding approximately 1 lb., except in Class 12.

6. No exhibitor shall be allowed to take more than one prize in any one class.

7. The Judge shall be empowered to withhold prizes in case of insufficient merit.

8. Should there be in any class three or less than three entries, the value of the first prize will be reduced to that of the second, the second to that of the third, and no third prize will be awarded.

9. Railway delivery charges from station to Showyard and back to be paid by exhibitor.

SILVER MEDALS FOR NEW OR IMPROVED IMPLEMENTS.

See Regulations on page 77.

FORESTRY EXHIBITION.

For information as to above, apply to the Secretary, Royal Scottish Arboricultural Society, 8 Rutland Square, Edinburgh.

WOOL DEMONSTRATIONS.

Arrangements are being made for Demonstrations on Wool, to be held in the Wool Shed on Wednesday, Thursday, and Friday, 19th, 20th, and 21st July.

DEMONSTRATION OF TRACTORS AND TRACTOR IMPLEMENTS

The Demonstration will take place at Fordel, Dalkeith, on 17th, 18th, 19th, and 20th October 1922. Entries close 10th July. Full particulars on entry forms, to be had on application.

**The Society's Show for 1923 will be held
at Inverness.**

THE PRESIDENT'S CHAMPION MEDALS

A Champion Medal is given by THE EARL OF STAIR, D.S.O., President of the Society, for the best Animal in each of the following sections :—

- | | | | |
|----------------------|--------------------------------|-----------------------|--------------------------------|
| 1. Shorthorn. | 10. Clydesdale Stallion. | 18. Shetland Pony. | 27. Goat. |
| 2. Aberdeen-Angus. | 11. Draught Gelding. | 19. Harness Horse. | 28. Large White Pig. |
| 3. Galloway. | 12. Clydesdale Mare and Filly. | 20. Blackface Sheep. | 29. Middle White. |
| 4. Highland. | 13. Hunter. | 21. Cheviot. | 30. Berkshire. |
| 5. Ayrshire. | 14. Hackney. | 22. Border Leicester. | 31. Large Black. |
| 6. British-Friesian. | 15. Pony. | 23. Half-bred. | 32. Gloucestershire Old Spots. |
| 7. Red Poll. | 16. Highland Pony. | 24. Oxford-Down. | 33. Cumberland. |
| 8. Belted Galloway. | 17. Western Island Pony. | 25. Suffolk. | |
| 9. Blue Grey Animal. | | 26. Shropshire. | |

NOTE.—Animals entered as Extra Stock may compete for these Medals. Former Winners of the President's Medals are eligible. The Society shall have the right to photograph the Winners for publication in the 'Transactions.' At this Show no animal can be awarded more than one of these Medals.

ENTRY FEES		CLASS	PREMIUMS			
Members	Non-Members		First	Second	Third	Fourth
			£	£	£	£
* CATTLE						
SHORTHORN						
<i>President's Medal for best Shorthorn</i>						
		¹ The Duthie Perpetual Challenge Cup, value £150, for best animal in the Shorthorn Classes, "Extra Stock" being eligible to compete.				
25/-	45/-	1 Bull calved before 1920	15	10	5	3
25/-	45/-	2 Bull calved in 1920	15	10	5	3
25/-	45/-	3 Bull calved on or after 1st January, and not later than 31st March 1921	12	8	4	2
25/-	45/-	4 Bull calved on or after 1st April 1921	10	6	4	2
		³ The Emilio R. Casares, jun., "Junior Champion Challenge Cup," value £50, for best Shorthorn Bull in Class 4, calved on or after 1st April of the year preceding the Show, that has passed the tuberculin test.				
		⁴ Best Shorthorn Bull in the Show, entered or eligible for entry in Coates's Herd-Book—£20.				
		⁴ Silver Medal to the Breeder of the winner of above Prize.				
		Breeder of best Bull of any age in the three Classes—The Silver Medal.				

* See Rules 32 and 33.

¹ This Cup was gifted by Mr William Duthie, Collynie. The Cup may not be won on more than one occasion with the same animal. The animal winning the Cup must be certified free from hereditary disease. The winner of the Cup shall, before delivery thereof is made to him, give security to the Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner of the Cup on each occasion will receive a miniature replica as a memento of his winning the Cup.

³ Prize money contributed anonymously.

⁴ Given by Mr Emilio R. Casares, jun., London. This Cup will become the property of the Exhibitor who shall win it three times, not necessarily in succession. A Silver Medal will be awarded to the winner each year.

⁴ Given by the Shorthorn Society.

ENTRY FEES			CLASS	CATTLE	PREMIUMS			
Members	Non-Members	First			Second	Third	Fourth	
		£			£	£	£	
SHORTHORN—continued								
25/-	45/-	5	Cow calved before 1920, in Milk	12	8	4	2	
25/-	45/-	6	Heifer or Cow calved in 1920	10	5	3	2	
25/-	45/-	7	Heifer calved in 1921	10	5	3	2	
¹ Best Shorthorn Female in the Show, entered or eligible for entry in Coates's Herd-Book—£20. Silver Medal to the Breeder of the winner of above Prize.								
PRIZE MONEY BY SOCIETY				£158				
CONTRIBUTED PRIZES				62				
ABERDEEN-ANGUS								
<i>President's Medal for best Aberdeen-Angus Animal</i>								
25/-	45/-	8	Bull calved before 1st Dec. 1919	15	10	5	3	
25/-	45/-	9	Bull calved on or after 1st Dec. 1919	15	10	5	3	
25/-	45/-	10	Bull calved on or after 1st Dec. 1920	12	8	4	2	
² Ballindalloch Challenge Cup, value £50, for the best Bull of any age in the three Classes. Breeder of best Bull of any age in the three Classes—The Silver Medal. Breeder of the Winner of the Ballindalloch Challenge Cup—The Silver Medal.								
25/-	45/-	11	Cow of any age in Milk	12	8	4	2	
² Ballindalloch Challenge Cup, value £50, for the best Cow of any age in the above Class. Breeder of the Winner of the Ballindalloch Challenge Cup—The Silver Medal.								
25/-	45/-	12	Heifer calved on or after 1st Dec. 1919	10	5	3	2	
25/-	45/-	13	Heifer calved on or after 1st Dec. 1920	10	5	3	2	
³ Champion Gold Medal, for best animal in the breeding Classes, breeding animals shown as "Extra Stock" being eligible to compete.								
PRIZE MONEY BY SOCIETY				£158				

¹ Given by the Shorthorn Society.² "The Ballindalloch Challenge Cups," value £50 each, are offered for the best Bull of any age and best Cow of any age (Heifers excluded) in the Aberdeen-Angus classes, the former presented by the late Sir George Macpherson Grant, Bart., and the latter by the late Sir John Macpherson Grant, Bart. Each Cup will become the property of the Exhibitor who shall win it five times, not necessarily in succession. The breeder of the successful animals each year will receive the Society's Silver Medal, with suitable inscription.³ Given by the Aberdeen-Angus Cattle Society.

ENTRY FEES		CLASS	CATTLE GALLOWAY	PREMIUMS			
Members	Non-Members			First £	Second £	Third £	Fourth £
			<i>President's Medal for best Galloway</i>				
			¹ Fife and Kinross Perpetual Gold Challenge Cup , value £200, for best Galloway animal, "Extra Stock" being eligible to compete.				
25/-	45/-	14	Bull calved before 1st Dec. 1919	15	10	5	3
25/-	45/-	15	Bull calved on or after 1st Dec. 1919	15	10	5	3
25/-	45/-	16	Bull calved on or after 1st Dec. 1920	12	8	4	2
			Breeder of best Bull of any age in the three Classes—The Silver Medal.				
25/-	45/-	17	Cow of any age in Milk	12	8	4	2
25/-	45/-	18	Heifer calved on or after 1st Dec. 1919	10	5	3	2
25/-	45/-	19	Heifer calved on or after 1st Dec. 1920	10	5	3	2
			² Dr Gillespie Memorial Challenge Trophy , value £50, for best Galloway Animal in the breeding Classes, breeding Animals shown as "Extra Stock" being eligible to compete—see conditions below.				
			PRIZE MONEY BY SOCIETY £158				
			HIGHLAND				
			<i>President's Medal for best Highland Animal</i>				
25/-	45/-	20	Bull calved before 1920	15	10	5	3
25/-	45/-	21	Bull calved in 1920	15	10	5	3
25/-	45/-	22	Bull calved in 1921	12	8	4	2
			³ Perpetual Victory Challenge Cup , approximate value 50 Guineas, for the best animal in the male Classes, "Extra Stock" being eligible to compete.				
			Breeder of best Bull of any age in the three Classes—The Silver Medal.				
25/-	45/-	23	Cow of any age in Milk	12	8	4	2

¹ This Cup, along with an endowment of £400, was subscribed for by the Counties of Fife and Kinross in commemoration of the Society's first Show at Cupar-Fife in 1912. This year the Cup is offered for the best Galloway animal. The animal winning the Cup must be certified free from hereditary disease. The winner of the Cup shall, before delivery thereof is made to him, give security to the Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner of the Cup on each occasion will receive a miniature replica in silver as a memento of his winning the Cup.

² This Trophy is offered by the Galloway Cattle Society of Great Britain and Ireland (subject to the conditions of that Society) for the best Galloway animal registered in the Galloway Herd-Book, entered in any of the Breeding classes, at the Show or Shows at which it may be competed for. The winner of the Trophy shall, before delivery thereof is made to him, give security to the Galloway Cattle Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner on each occasion will receive the Galloway Cattle Society's Silver Medal as a memento of his winning the Trophy.

³ Given by the Highland Cattle Society of Scotland.

ENTRY FEES		CLASS	CATTLE	PREMIUMS			
Members	Non-Members			First	Second	Third	Fourth
25/-	45/-	24	Heifer calved in 1919	£ 10	£ 5	£ 3	£ 2
25/-	45/-	25	Heifer calved in 1920	10	5	3	2
			¹ Perpetual Victory Challenge Cup, approximate value 35 Guineas, for the best animal in the female Classes, "Extra Stock" being eligible to compete.				
			PRIZE MONEY BY SOCIETY . . . £158				
			AYRSHIRE				
			<i>Exhibitors are invited to produce evidence of the Milk Yield of Cows, and the Milking Pedigree of Bulls and younger females. This evidence should be in the form of a Certificate signed by the Secretary of the Milk Records Association. It must be lodged at the time of Entry, and will be made available to the Judges for their information and will also appear in the Catalogue.</i>				
			<i>President's Medal for best Ayrshire</i>				
			² Cowhill Champion Cup, approximate value £30, for best animal of the Ayrshire breed, entered with a number in the Herd-Book. The Cup to be won three times, not necessarily in succession, by the same person with different animals, before becoming the property of the winner.				
45/-	65/-	26	³ Cow in Milk,* calved before 1919	12	8	4	
45/-	65/-	27	³ Cow in Milk,* calved after 1st Jan. 1919	10	7	3	
45/-	65/-	28	³ Cow of any age in Calf,* and due to calve before 1st Dec. of the year of the Show	10	7	3	
25/-	45/-	29	Heifer calved in or after 1919, in Calf and due to calve before 1st Dec. of the year of the Show	10	7	3	
25/-	45/-	30	Heifer calved in 1920	10	5	3	
25/-	45/-	31	Heifer calved in 1921	8	5	3	
			⁴ Special Prize of £10 for the best Female Animal of the Ayrshire breed entered with a number in the Ayrshire Cattle Herd-Book not later than 1st June 1922.				
25/-	45/-	32	Bull calved before 1920	12	8	4	
25/-	45/-	33	Bull calved in 1920	10	7	3	

* See Rule 72.

¹ Given by the Highland Cattle Society of Scotland.

² Presented by Major Henry Keswick, Cowhill Tower, Dumfries, to Ayrshire Cattle Herd-Book Society, to be competed for annually at the Shows of the Highland and Agricultural Society of Scotland.

³ Cows in these Classes must have produced a calf within fifteen months prior to the Show.

⁴ Given by the Ayrshire Cattle Herd-Book Society.

ENTRY FEES		CLASS		PREMIUMS		
Members	Non-Members			First	Second	Third
				£	£	£
CATTLE						
AYRSHIRE—continued						
25/-	45/-	34	Bull calved in 1921	8	5	3
			Breeder of best Bull of any age in Classes 32, 33, and 34—The Silver Medal.			
			¹ Special Prize of £10 for the best Male Animal of the Ayrshire breed entered with a number in the Ayrshire Cattle Herd-Book not later than 1st June 1922.			
			PRIZE MONEY BY SOCIETY			£178
			CONTRIBUTED PRIZES			20
BRITISH FRIESIAN						
<i>President's Medal for best British Friesian Animal</i>						
25/-	45/-	35	Bull calved in or before 1919	10	5	3
25/-	45/-	36	Bull calved in 1920	10	5	3
25/-	45/-	37	Bull calved in 1921	10	5	3
			Champion Prize of £5 given by the British Friesian Cattle Society for the best male exhibited.			
25/-	45/-	38	² Cow in milk,* calved in or before 1918	10	5	3
25/-	45/-	39	Heifer in milk, calved in 1919 or 1920	10	5	3
25/-	45/-	40	Heifer in calf, with her first calf to calve before 3 years old	10	5	3
25/-	45/-	41	Heifer calved in 1921	10	5	3
			Champion Prize of £5 given by the British Friesian Cattle Society for the best female exhibited.			
			PRIZE MONEY BY SOCIETY			£73
			³ CONTRIBUTED PRIZES			63
RED POLL						
<i>President's Medal for best Red Poll Animal</i>						
25/-	45/-	42	Bull of any age	10	5	3
25/-	45/-	43	² Cow or Heifer in milk or in calf, calved in or before 1919	10	5	3
25/-	45/-	44	Heifer calved in 1920 or 1921	10	5	3
			PRIZE MONEY BY SOCIETY			£27
			⁴ CONTRIBUTED PRIZES			27

* See Rule 72.

¹ Given by the Ayrshire Cattle Herd-Book Society.² Cows in these Classes must have produced a calf within fifteen months prior to the Show.³ £63 contributed by the British Friesian Cattle Society.⁴ Contributed by Red Poll Cattle Society.

ENTRY FEES		CLASS		PREMIUMS		
Members	Non-Members			First	Second	Third
				£	£	£
CATTLE						
BELTED GALLOWAY						
<i>President's Medal for best Belled Galloway Animal</i>						
¹ Knockbrex Challenge Cup, value £50, for the best Belted Galloway Animal.						
25/-	45/-	45	Bull calved before 1st December 1920	8	4	2
25/-	45/-	46	Bull calved on or after 1st December 1920	8	4	2
25/-	45/-	47	Cow or Heifer calved before 1st December 1919 in milk or in calf; if in calf, to calve on or before 1st December of the year of the Show	8	4	2
25/-	45/-	48	Heifer calved on or after 1st December 1919	8	4	2
PRIZE MONEY BY SOCIETY				£28		
² CONTRIBUTED PRIZES				28		
EXTRA CATTLE—BLUE GREY						
<i>President's Medal for best Blue Grey Animal</i>						
<i>(The produce of a Shorthorn Bull and Galloway Cow or Galloway Bull and Shorthorn Cow).</i>						
25/-	45/-	49	Steer calved on or after 1st January 1920	10	5	3
25/-	45/-	50	Steer calved on or after 1st January 1921	10	5	3
³ CONTRIBUTED				£36		
PRIZE MONEY BY SOCIETY				£938	0	
CONTRIBUTED				236	0	
CUPS, MEDALS, &c.				729	5	
Total Prizes for Cattle				£1903	5	

¹ This Cup is offered by Mrs Brown of Knockbrex for the best Belted Galloway animal registered in the Dun and Belted Galloway Cattle Breeders' Association Herd-Book, entered in any of the Breeding classes, at the Show or Shows at which it may be competed for. The winner of the Trophy shall, before delivery thereof is made to him, give security to the Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner on each occasion will receive a Silver medal as a memento of his winning the Trophy.

² Contributed by the Dun and Belted Galloway Cattle Breeders' Association.

³ Contributed by the Galloway Cattle Society of Great Britain and Ireland.

ENTRY FEES		CLASS	PREMIUMS			
Members	Non-Members		First	Second	Third	Fourth
			£	£	£	£
¹ HORSES						
FOR AGRICULTURAL PURPOSES						
DRAUGHT STALLIONS						
<i>President's Medal for best Clydesdale Stallion or Colt</i>						
55/-	75/-	51	Stallion foaled before 1919	20	15	10 4
55/-	75/-	52	Entire Colt foaled in 1919	20	15	10 4
55/-	75/-	53	Entire Colt foaled in 1920	20	15	10 4
40/-	60/-	54	Entire Colt foaled in 1921	15	10	6 4
Breeder of best Male Animal of any age in Classes 51, 52, 53, and 54—The Silver Medal.						
PRIZE MONEY BY SOCIETY . £182						
DRAUGHT GELDINGS						
<i>President's Medal for best Draught Gelding</i>						
40/-	60/-	55	Draught Gelding foaled before 1919	10	5	3 -
40/-	60/-	56	Draught Gelding foaled in 1919	6	4	3 -
40/-	60/-	57	Draught Gelding foaled in 1920	6	4	3 -
PRIZE MONEY BY SOCIETY . £44						
DRAUGHT MARES AND FILLIES						
<i>President's Medal for best Clydesdale Mare or Filly</i>						
² Renfrewshire Perpetual Gold Challenge Cup, value £250, for best Clydesdale Mare or Filly, "Extra Stock" being eligible to compete.						
55/-	75/-	58	Mare of any age, with Foal at foot	20	12	7 4
40/-	60/-	59	Yeld Mare foaled before 1919	12	9	6 4
40/-	60/-	60	Yeld Mare or Filly foaled in 1919	12	9	6 4
40/-	60/-	61	Filly foaled in 1920	12	9	6 4

¹ For prizes given by the Society, no animal is allowed to compete in more than one Class, except that horses entered in other Classes may also compete in the Jumping and Driving Classes.

² This Cup, along with an endowment of £500, was provided from money collected in Renfrewshire by the late Provost Muir MacKean of Paisley, and is in commemoration of the Society's first Show in the county of Renfrew in 1913. This year the Cup is offered for the best animal of the Shorthorn breed. The animal winning the Cup must be certified free from hereditary disease. The winner of the Cup shall, before delivery thereof is made to him, give security to the Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner of the Cup on each occasion will receive a miniature replica in silver as a memento of his winning the Cup.

Stallions and Colts, 2 years old and upwards, must be licensed for stud purposes. See Rule 39.

ENTRY FEES		CLASS		PREMIUMS			
Members	Non-Members			First	Second	Third	Fourth
				£	£	£	£
40/-	60/-	62	HORSES DRAUGHT MARES AND FILLIES—continued Filly foaled in 1921 12 Best Clydesdale Mare or Filly—Cawdor Challenge Cup, value 50 guineas. See Conditions below. ¹ * William Taylor Memorial Prize of £10 and Certificate to the breeder of the best Clydesdale Filly entered in Classes 61 or 62. PRIZE MONEY BY SOCIETY . . . £167 CONTRIBUTED PRIZES . . . 10 Total Prize Money for Draught Horses, £403		9	6	4
			HUNTERS (Classes 67, 68, 69, and 70 to be judged at 2 30 P.M. on Tuesday, 18th July) President's Medal for best Hunter				
55/-	75/-	63	Hunter Brood Mare, with Foal at Foot 15	7	3	—	—
40/-	60/-	64	Yeld Mare, Filly, or Gelding, for field, foaled in 1919—in hand 10	5	3	—	—
40/-	60/-	65	Yeld Mare, Filly, or Gelding, for field, foaled in 1920—in hand 10	5	3	—	—
40/-	60/-	66	Colt, Gelding, or Filly, foaled in 1921, the produce of thoroughbred Stallion or registered Hunter sire, out of Mare of any breed 10	5	3	—	—
40/-	60/-	67	Mare or Gelding, foaled in 1918—in saddle 15	10	5	—	—
40/-	60/-	68	Mare or Gelding, foaled before 1918, to carry any weight up to 13 st. 7 lb.—in saddle 15	10	5	—	—
40/-	60/-	69	Mare or Gelding, foaled before 1918, to carry 13 st. 7 lb. and over—in saddle 15	10	5	—	—
40/-	60/-	70	Hack of Hunter type, foaled in or before 1918, 15.2 hands and under—in saddle 15	10	5	—	—
			³ Best Hunter Filly, not exceeding three years old, registered with a number in the Hunter Stud-Book, or the entry tendered within a month of the award—Champion Gold Medal. PRIZE MONEY BY SOCIETY . . . £199				

¹ This Cup is offered by the Clydesdale Horse Society of Great Britain and Ireland (subject to the conditions of that Society) for the best Clydesdale Mare or Filly registered in the Clydesdale Stud-Book, entered in any of the Draught Horse Classes, at the Show at which it may be competed for. The Cup must be won four times by an Exhibitor with different animals (but not necessarily in consecutive years) before it becomes his absolute property. The animal winning this Cup must be certified free from hereditary disease. The winner of the Cup, other than the absolute winner, shall, before delivery thereof is made to him, give security to the Clydesdale Horse Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. Until the Cup be won outright, the winner on each occasion will receive the Clydesdale Horse Society's Silver Medal as a memento of his winning the Cup.

² Given by William Taylor Memorial Committee.

³ Given by the Hunters' Improvement and National Light Horse Breeding Society.

Stallions and Colts, 2 years old and upwards, must be licensed for stud purposes. See Rule 39.

ENTRY FEES		CLASS	HORSES HACKNEYS	PREMIUMS		
Members	Non-Members			First	Second	Third
				£	£	£
			(All to be shown in hand)			
			<i>President's Medal for best Hackney in Classes 71 to 75</i>			
55/-	75/-	71	Brood Mare, over 14 hands, with Foal at foot, or to foal this season to a registered sire . . .	10	6	4
40/-	60/-	72	Yeld Mare or Filly foaled in 1919 . . .	8	5	3
40/-	60/-	73	Entire Colt or Filly foaled in 1920 . . .	8	5	3
40/-	60/-	74	Entire Colt or Filly foaled in 1921 . . .	8	5	3
			¹ Champion Prize of £10 is offered by the Hackney Horse Society for best Mare or Filly in Hackney or Pony Classes, animals entered as "Extra Stock" being eligible.			
55/-	75/-	75	Stallion foaled in or before 1919, over 14 hands . .	10	6	4
			All animals entered in the above Hackney Classes must be registered in the Hackney Stud-Book except in Class 74, which must be eligible for entry. Entry forms must be accompanied by certificate to this effect from Mr F. F. Euren, 12 Hanover Square, London, W.			
			PRIZE MONEY BY SOCIETY . . .	£88		
			CONTRIBUTED PRIZES . . .	10		
			PONIES			
			(Classes 76 to 78 will be judged by Hackney Judge)			
			<i>President's Medal for best Pony</i>			
40/-	60/-	76	Stallion, 3 years old and upwards, 14 hands and under—in hand . . .	5	3	2
40/-	60/-	77	Yeld Mare, Filly, or Gelding, 3 years old and upwards, over 13 and not over 14 hands—in saddle . .	5	3	2
40/-	60/-	78	Yeld Mare, Filly, or Gelding, 3 years old and upwards, not over 13 hands—in saddle . . .	5	3	2
			(See Champion Prize under Hackneys, above)			
			PRIZE MONEY BY SOCIETY . . .	£30		

¹ A Mare 6 years old or more must have had a living foal. Winners of the Hackney Society's £10 Prize or Gold Medal in 1922, except at the London and Royal English Shows, excluded. The winner must be entered or accepted for entry in Hackney Stud-Book and certified free from hereditary disease.

Stallions and Colts, 2 years old and upwards, must be licensed for stud purposes. See Rule 39.

ENTRY FEES		CLASS		PREMIUMS		
Members	Non-Members			First	Second	Third
				£	£	£
HORSES						
¹ HIGHLAND PONIES						
<i>(To be judged at 1.30 P.M. on Tuesday, 18th July)</i>						
<i>President's Medal for best Highland Pony</i>						
40/-	60/-	79	Stallion, 3 years old or upwards, not exceeding 14.2 hands	8	4	2
40/-	60/-	80	Mare, 3 years old or upwards, not exceeding 14.2 hands, yeld or with Foal at foot	8	4	2
40/-	60/-	81	Entire Colt, foaled after 1st January 1920	6	4	2
40/-	60/-	82	Filly, foaled after 1st January 1920	6	4	2
² Special Prize of £10 for the best Highland Stallion, Mare, Colt, or Filly, entered or accepted for entry in the Highland Section of the National Pony Stud-Book, "Extra Stock" being eligible to compete. Competition to be strictly confined to animals passed sound and free from hereditary disease.						
PRIZE MONEY BY SOCIETY				£52		
CONTRIBUTED PRIZES				10		
WESTERN ISLAND PONIES						
<i>(To be judged at 1.30 P.M. on Tuesday, 18th July)</i>						
<i>President's Medal for best Western Island Pony</i>						
40/-	60/-	83	Stallion, 3 years old or upwards, not exceeding 14.2 hands	8	4	2
40/-	60/-	84	Mare, 3 years old or upwards, not exceeding 14.2 hands, yeld or with Foal at foot	8	4	2
40/-	60/-	85	Entire Colt, foaled after 1st January 1920	6	4	2
40/-	60/-	86	Filly, foaled after 1st January 1920	6	4	2
² Special Prize of £10 for the best Western Island Stallion, Mare, Colt, or Filly, entered or accepted for entry in the Highland Section of the National Pony Stud-Book, "Extra Stock" being eligible to compete. Competition to be strictly confined to animals passed sound and free from hereditary disease.						
PRIZE MONEY BY SOCIETY				£52		
CONTRIBUTED PRIZES				10		

¹ The Board of Agriculture for Scotland gives £40 towards prizes for Highland Ponies.

² Given by the National Pony Society.

Stallions and Colts, 2 years old and upwards, must be licensed for stud purposes. See Rule 38.

ENTRY FEES			CLASS	HORSES	PREMIUMS			
Members	Non-Members	First			Second	Third	Fourth	
				SHETLAND PONIES				
(To be judged at 1.30 P.M. on Tuesday, 18th July)					£	£	£	£
(All to be shown in hand)								
President's Medal for best Shetland Pony								
35/-	55/-	87	Stallion, not exceeding 10½ hands, foaled before 1919	8	5	3	2	
35/-	55/-	88	Entire Colt, not exceeding 10½ hands, foaled in 1919 or 1920	8	5	3	2	
35/-	55/-	89	Mare, not exceeding 10½ hands, with Foal at foot	8	5	3	2	
35/-	55/-	90	Yeld Mare, not exceeding 10½ hands	8	5	3	2	
35/-	55/-	91	Filly, not exceeding 10½ hands, foaled in 1919 or 1920	8	5	3	2	
			¹ Shetland Pony Foal, entered or eligible for entry in the Stud-Book, exhibited along with dam in Class 89	5	3	2	-	
			² Silver Medal for the best Shetland Pony of the sex opposite to that of the winner of the President's Medal, entered or eligible for entry in the Shetland Pony Stud-Book.					
PRIZE MONEY BY SOCIETY				£90				
CONTRIBUTED PRIZES				10				
³ HORSES IN HARNESS								
(To be judged at 2.30 P.M. on Tuesday, 18th July)								
⁴ President's Medal for best animal in the Classes for Horses in Harness								
40/-	60/-	92	Yeld Mare, Filly, or Gelding, any age, in Harness, 15 hands and upwards, to be driven in the ring	10	5	3	-	
40/-	60/-	93	Yeld Mare, Filly, or Gelding, any age, in Harness, under 15 hands, to be driven in the ring.	10	5	3	-	
			Special Prize for best Pony in Class 93, under 13 hands	5	-	-	-	
PRIZE MONEY BY SOCIETY				£41				
PRIZE MONEY BY SOCIETY				£905 0				
CONTRIBUTED				90 0 ⁸				
CUPS, MEDALS, &c.				312-10				
Total Prizes for Horses				£1307 10				

¹ Given by "Four Lovers of the Breed," per Mr W. Mungall of Transy.

² Given by the Shetland Pony Stud-Book Society.

³ Animals entered in other Classes may be entered in the Harness Classes at an additional fee of 5s. if they are eligible.

⁴ An animal that has won a President's Medal in another section in this Show shall not be eligible to compete for the Medal in this section.

Shed accommodation for machines for Driving Competitions—Members, 10s.; Non-Members, 20s.

JUMPING COMPETITIONS

SPECIAL REGULATIONS

(See also the Regulations on pages 67 to 74)

1. Jumping Competitions will take place on the afternoons of Wednesday, Thursday, and Friday, the 19th, 20th, and 21st July, and on the evening of Thursday, 20th July.
2. Entries for each day's Competitions will close at the Secretary's Office in the Showyard at 6 p.m. on the preceding day. Entries for Evening Jumping may be received till the beginning of the Competition.
3. *Entry Fees*.—Wednesday, £1; Thursday and Friday, 10s. for each class. Evening Jumping, 10s.
4. *Accommodation* for jumping horses will be provided as follows: Covered shed in which to stand during the day free of charge; or, on application to the Secretary not less than ten days before the opening of the Show, stalls or loose-boxes will be provided at a charge (in addition to the Entry Fee) of £2 for a stall and £3 for a loose-box, which must be paid along with the Entry Fee at the time of application.
5. Horses entered for jumping only need not enter the Showyard till 12 noon on the day of Competition, and may leave the Showyard at the close of the jumping.
6. *The Jumps* may consist of Single Hurdle, Gate, Double Hurdle, Wall, and Water Jump, power being reserved by the Society to alter these, as well as the Handicaps, as may be thought desirable.

CLASS		First	Second	Third	Fourth	Fifth
		£	£	£	£	£
	WEDNESDAY.					
1	Horse or Pony any height	20	15	10	5	3
	THURSDAY.					
2	Horse or Pony any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in Class 1	10	8	5	3	2
	FRIDAY.					
3	Horse or Pony any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in either of Classes 1 or 2—4 inches extra for the winner of the two first prizes in Classes 1 and 2	10	8	5	3	2
	Champion Prize for most points in Prizes with one or more horses in above Classes—First Prize to count five points; Second Prize, four points; Third Prize, three points; Fourth Prize, two points; and Fifth Prize, one point—the money to be evenly divided in the event of a tie	10	—	—	—	—
	THURSDAY EVENING.					
4	Horse or Pony any height	10	8	5	3	2
	Total Prize Money for Jumping, £147					

Special Entry Forms for above Competitions to be had on application.

ENTRY FEES		CLASS	S H E E P	PREMIUMS			
Members	Non-Members			First	Second	Third	Fourth
			*BLACKFACE				
			<i>President's Medal for best animal of Blackface breed</i>				
15/-	25/-	94	Tup above one shear	12	8	4	2
15/-	25/-	95	Shearling Tup	12	8	4	2
15/-	25/-	96	Shearling Tup, which shall have been entirely out-wintered, and which shall not have been clipped before 1st May 1922	12	8	4	2
			Tup, entered in Classes 94, 95, and 96, carrying the fleece best adapted for protection, combined with suitability for manufacturing purposes—to be judged by Judge of Wool	5	3	2	—
15/-	25/-	97	Ewe above one shear, with her Lamb at foot	10	5	2	—
15/-	25/-	98	Shearling Ewe or Gimmer	10	5	2	—
15/-	25/-	99	¹ Ewe and Lamb, unclipped, taken off the hill not earlier than 1st June, and not band-fed or kept enclosed on low ground before that date—to be judged for wool and breed type	10	5	2	—
15/-	25/-	100	² Special Prizes of £5, £3, and £2, for Blackface Tup Lamb, bred by Exhibitor	5	3	2	—
			PRIZE MONEY BY SOCIETY				
			CONTRIBUTED				
			CHEVIOT				
			<i>President's Medal for best animal of the Cheviot breed</i>				
			³ Paisley Perpetual Gold Challenge Cup, value £300, for best animal of the Cheviot breed, "Extra Stock" being eligible to compete.				
15/-	25/-	101	Tup above one shear	12	8	4	2
15/-	25/-	102	Shearling Tup	12	8	4	2
15/-	25/-	103	Ewe above one shear, with her Lamb at foot	10	5	2	—
15/-	25/-	104	Shearling Ewe or Gimmer	10	5	2	—
			⁴ Perpetual Challenge Cup, value £25, gifted by Mr J. Borthwick, for best Sheep in the Cheviot classes.				
			PRIZE MONEY BY SOCIETY				

* Formal Declarations must be made at time of entry that the conditions as regards clipping, &c., have been strictly adhered to.

¹ Contributed per Dr F. A. E. Crew, Animal Breeding Research Department, University of Edinburgh.

² Given by Major Alexander Browne of Callaly Castle.

³ This Cup, along with an endowment of £600, was provided from money collected in Paisley by the late Provost Muir M'Kean, and is in commemoration of the Society's first Show at Paisley in 1913. This year the Cup is offered for the best animal of the Cheviot breed. The animal winning the Cup must be certified free from hereditary disease. The winner of the Cup shall, before delivery thereof is made to him, give security to the Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner of the Cup on each occasion will receive a miniature replica in silver as a memento of his winning the Cup.

⁴ Given by Cheviot Sheep Society.

ENTRY FEES			CLASS		PREMIUMS			
Members	Non-Members	First			Second	Third	Fourth	
					£	£	£	£
SHEEP								
BORDER LEICESTER								
President's Medal for best animal of Border Leicester breed								
				¹ Tweeddale Gold Medal for best Border Leicester Tup.				
15/-	25/-	105		Tup above one shear	12	8	4	2
15/-	25/-	106		Shearling Tup	12	8	4	2
² Gold Medal for best male animal in the Border Leicester Classes, registered or eligible for registration in the Border Leicester Flock-Book. Animals entered as "Extra Stock" not eligible.								
15/-	25/-	107		Ewe above one shear	10	5	2	—
15/-	25/-	108		Shearling Ewe or Gimmer	10	5	2	—
² Gold Medal for best female animal in the Border Leicester Classes, registered or eligible for registration in the Border Leicester Flock-Book. Animals entered as "Extra Stock" not eligible.								
PRIZE MONEY BY SOCIETY					£86			
HALF-BRED								
President's Medal for best Half-Bred Animal								
15/-	25/-	109		Tup above one shear	10	7	3	—
15/-	25/-	110		Shearling Tup	10	7	3	—
15/-	25/-	111		Ewe above one shear	10	5	2	—
15/-	25/-	112		Shearling Ewe or Gimmer	10	5	2	—
15/-	25/-	113		Three Ewe Lambs	5	3	2	—
PRIZE MONEY BY SOCIETY					£34			
OXFORD-DOWN								
(All sheep to be entered or eligible for entry in the Flock-Book.)								
President's Medal for best Oxford-Down Animal								
³ Robertson Challenge Cup, value £50, for the best Oxford-Down animal bred in Scotland, to be won three times by the same owner, but with different sheep, before becoming his property.								
15/-	25/-	114		Shearling Tup	8	5	3	—
15/-	25/-	115		Shearling Ewe or Gimmer	8	5	3	—
15/-	25/-	116		Tup Lamb	8	5	3	—
15/-	25/-	117		Three Ewe Lambs	8	5	2	—
PRIZE MONEY BY SOCIETY					£42			
³ CONTRIBUTED PRIZES					21			

¹ Annual Free Income from Fund of £500.² Given by the Society of Border Leicester Sheep-Breeders.³ Given by Oxford-Down Sheep-Breeders' Association.

ENTRY FEES		CLASS	SHEEP	PREMIUMS		
Members	Non-Members			First	Second	Third
			SUFFOLK	£	£	£
			(All sheep to be entered or eligible for entry in the Flock-Book.)			
			<i>President's Medal for best Suffolk Sheep</i>			
15/-	25/-	118	Shearling Tup	8	5	3
15/-	25/-	119	Shearling Ewe or Gimmer	8	5	3
15/-	25/-	120	Tup Lamb	8	5	3
15/-	25/-	121	Three Ewe Lambs	8	5	2
			¹ Special Prizes of £7, 7s. and £3, 3s. for best group comprising Tup, Ewe, Tup Lamb, and Ewe Lamb entered in above classes, all to be registered or eligible for registration in Flock Book, and, with the exception of the Shearling Tup, bred in Scotland by exhibitor.			
			PRIZE MONEY BY SOCIETY	£38 0		
			² CONTRIBUTED PRIZES	25 0		
			SPECIAL PRIZES	10 10		
			SHROPSHIRE			
			<i>President's Medal for best Shropshire Animal</i>			
15/-	25/-	122	Shearling Tup	6	4	2
15/-	25/-	123	Shearling Ewe or Gimmer	5	3	2
			PRIZE MONEY BY SOCIETY	£22		
			FAT SHEEP			
15/-	25/-	124	Three Fat Lambs, any breed or cross, dropped in the year of the Show	5	3	2
			£10			
			PRIZE MONEY BY SOCIETY	£490 0		
			CONTRIBUTED	83 10		
			CUPS, MEDALS, &c.	420 0		
			Total Prizes for Sheep	£993 10		

¹ Given by Mr Dugald M'Kechnie, Glasgow.² Given by the Suffolk Sheep Society.

ENTRY FEES		CLASS	PREMIUMS		
Members	Non-Members		First	Second	Third
			£	£	£
* GOATS					
<i>President's Medal for best animal in the Goat Classes</i>					
<i>(All animals must be registered)</i>					
OPEN CLASSES					
		¹ Challenge Cup, value 20 Guineas, for the best Female Goat in the Show.			
		² Challenge Cup, value £10, for best Female Anglo-Nubian Goat over two years old, in milk, entered in the Anglo-Nubian section of the Herd-Book, "Extra Stock" being eligible to compete.			
5/-	10/-	125 Male Goat, any variety, over one year	3	2	1
5/-	10/-	126 Female Goat, any variety, over two years	3	2	1
5/-	10/-	127 Goatling, any variety, over one and not exceeding two years	3	2	1
5/-	10/-	128 Male Kid, any variety, not exceeding one year	3	2	1
5/-	10/-	129 Female Kid, any variety, not exceeding one year	3	2	1
5/-	10/-	130 † Milking Competition, open to Classes 126 and 132 (animals two years and over)	3	2	1
CONFINED TO SCOTTISH EXHIBITORS					
5/-	10/-	131 Male Goat, any variety, one year old and over	3	2	1
5/-	10/-	132 Female Goat, in milk, any age	3	2	1
NOTE.—No animal is allowed to compete in more than one class, except that Goats entered in Classes 126 and 132 may also be entered in Class 130.					
PRIZE MONEY BY SOCIETY			£36		
BOARD OF AGRICULTURE FOR SCOTLAND			12		
CUPS			31		
Total Prizes for Goats			£79		

The Competition for Goats (Classes 125 to 130) is recognised by the British Goat Society, 5 Fenchurch Street, London, E.C., which will give a Challenge Certificate (qualifying for a Championship) for the best dual purpose Goat; a Bronze Medal for the best female exhibit in Classes 126, 127, and 129; and a Bronze Medal for the best male exhibit in Classes 125 and 128.

¹ Given by Lord Dewar, London—to be competed for annually.

² Given by Mrs S. Macdonald, Garrochty—to be competed for annually.

† The milk yielded by goats in this Class shall be the property of the Society.

* For Regulations see pages 80, 81.

ENTRY FEES		CLASS		PREMIUMS		
Members	Non-Members			First	Second	Third
			* PIGS			
			LARGE WHITE			
			<i>President's Medal for best Large White Pig</i>			
			¹ Gold Medal, or Cash, value £5, for the best Large White Boar in the Show.			
15/-	25/-	133	Boar farrowed before 1921	8	4	2
15/-	25/-	134	Boar farrowed in 1921	8	4	2
15/-	25/-	135	Boar farrowed in 1922	6	3	1
			¹ Gold Medal, or Cash, value £5, for the best Large White Sow in the Show.			
15/-	25/-	136	Sow farrowed before 1921	8	4	2
15/-	25/-	137	Sow farrowed in 1921	8	4	2
15/-	25/-	138	Sow farrowed in 1922	6	3	1
			PRIZE MONEY BY SOCIETY			
			MIDDLE WHITE			
			<i>President's Medal for best Middle White Pig</i>			
			¹ Gold Medal, or Cash, value £5, for the best Middle White Boar in the Show.			
15/-	25/-	139	Boar, any age	8	4	2
15/-	25/-	140	Boar farrowed in 1922	6	3	1
			¹ Gold Medal, or Cash, value £5, for the best Middle White Sow in the Show.			
15/-	25/-	141	Sow, any age	8	4	2
15/-	25/-	142	Sow farrowed in 1922	6	3	1
			PRIZE MONEY BY SOCIETY			
			BERKSHIRE			
			<i>(All animals to be entered or eligible for entry in the Herd-Book.)</i>			
			<i>President's Medal for best Berkshire Pig</i>			
			² Champion Prize of £10 for the best animal in the Berkshire Classes. Animals must be entered in, or eligible for entry in, the British Berkshire Society's Herd-Book, having the date of farrow and Breeder's name, the names and numbers of the sire and dam entered in catalogue.			
15/-	25/-	143	Boar, any age	8	4	2
15/-	25/-	144	Boar farrowed in 1922	6	3	1
15/-	25/-	145	Sow, any age	8	4	2
15/-	25/-	146	Sow farrowed in 1922	6	3	1
			PRIZE MONEY BY SOCIETY			
			CONTRIBUTED PRIZES			

* See Rule 35.

¹ Given by the National Pig-Breeders' Association.² Given by the British Berkshire Society.

ENTRY FEES			CLASS	PREMIUMS		
Members	Non-Members			First	Second	Third
				£	£	£
PIGS						
LARGE BLACK						
<i>President's Medal for best Large Black Pig</i>						
15/-	25/-	147	¹ Champion Cup, value £10, 10s., for the best Large Black animal exhibited, "Extra Stock" being eligible to compete. The Cup to be won twice in succession or three times at intervals by the same exhibitor before it becomes his absolute property.	8	4	2
15/-	25/-	148	Boar, any age	8	4	2
15/-	25/-	149	Boar farrowed in 1921	6	3	1
15/-	25/-	150	Boar farrowed in 1922	8	4	2
15/-	25/-	151	Sow, any age	8	4	2
15/-	25/-	152	Sow farrowed in 1921	8	4	2
15/-	25/-	152	Sow farrowed in 1922	6	3	1
PRIZE MONEY BY SOCIETY				£52		
¹ CONTRIBUTED PRIZES				24		
GLOUCESTERSHIRE OLD SPOTS						
<i>President's Medal for best Gloucestershire Old Spot Pig</i>						
15/-	25/-	153	² Silver Challenge Trophy, value Forty Guineas, for best Gloucestershire Old Spot Animal, to be won three times, not necessarily in succession, before becoming the property of the winner, "Extra Stock" being eligible to compete.	8	4	2
15/-	25/-	154	Boar, any age	6	3	1
15/-	25/-	155	Boar farrowed in 1922	8	4	2
15/-	25/-	156	Sow, any age	6	3	1
15/-	25/-	156	Sow farrowed in 1922	6	3	1
PRIZE MONEY BY SOCIETY				£33		
² CONTRIBUTED PRIZES				15		
CUMBERLAND						
<i>President's Medal for best Cumberland Pig</i>						
15/-	25/-	157	Boar, any age	8	4	2
15/-	25/-	158	Boar farrowed in 1922	6	3	1
15/-	25/-	159	Sow, any age	8	4	2
15/-	25/-	160	Sow farrowed in 1922	6	3	1
PRIZE MONEY BY SOCIETY				£28		
³ CONTRIBUTED PRIZES				20		
PRIZE MONEY BY SOCIETY				£285 0		
CONTRIBUTED				69 0		
CUPS, MEDALS, &c.				72 10		
Total Prizes for Pigs				£426 10		

¹ Given by Large Black Pig Society.² Given by the Gloucestershire Old Spots Pig Society.³ Given by the Cumberland Pig-Breeders' Association.**EXTRA STOCK** (*former winners and Stock not eligible for Ordinaire Classes*)

Animals not included in the Classes for Competition may be exhibited as Extra Stock and may receive Awards as follows:—Very Highly Commended, the Silver Medal; Highly Commended, the Medium Silver Medal; Commended, the Bronze Medal.

Animals entered as Extra Stock are eligible to compete for the President's Medals, whether former winners of these Medals or not. They are also eligible to compete for Special Prizes where the conditions of these prizes permit.

Entry fees—same as corresponding Classes.

* POULTRY

¹ **Champion Challenge Bowl**, value £50, for the best exhibit in the Poultry Classes.

First Premium—ONE SOVEREIGN; *Second Premium*—TEN SHILLINGS. In each Class in which there are four or more pens competing, a Third Prize of Five Shillings may be awarded, provided there is sufficient merit in the pens. Three or more Commendations may also be given—thus, Very Highly Commended, Highly Commended, and Commended.

Champion Medals are offered as follows:—

- | | |
|---|---|
| 1. Best Cock, any Variety.
2. Best Hen, any Variety.
3. Best Cockerel, any Variety. | 4. Best Pullet, any Variety.
5. Best Waterfowl.
6. Best Turkey. |
|---|---|

Aged Birds must have been hatched previous to, and Cockerels and Pullets in, the year of the Show.

Entry Fees—Members, 2s. 6d.; Non-Members, 4s.

LEGHORN—	Class	WYANDOTTE—continued	Class
<i>White</i>	1. Cock	<i>Gold or Silver</i>	37. Cockerel
	2. Hen		38. Pullet
	3. Cockerel	<i>White</i>	39. Cock
	4. Pullet		40. Hen
<i>Any other Colour</i>	5. Cock		41. Cockerel
	6. Hen		42. Pullet
	7. Cockerel	<i>Partridge</i>	43. { Cock or
	8. Pullet		{ Cockerel
MINORCA	9. Cock		44. { Hen or
	10. Hen		{ Pullet
	11. Cockerel	<i>Any other Colour</i>	45. { Cock or
	12. Pullet		{ Cockerel
SCOTCH GREY	13. Cock		46. { Hen or
	14. Hen		{ Pullet
	15. Cockerel	RHODE ISLAND BFD	47. Cock
	16. Pullet		48. Hen
PLYMOUTH ROCK—			49. Cockerel
<i>Barred</i>	17. Cock		50. Pullet
	18. Hen	FAVEROLLERS	51. Cock
	19. Cockerel		52. Hen
	20. Pullet		53. Cockerel
<i>Any other Colour</i>	21. { Cock or		54. Pullet
	{ Cockerel	SUSSEX—	
	22. { Hen or	<i>Light</i>	55. Cock
	{ Pullet		56. Hen
ORPINGTON—			57. Cockerel
<i>Black</i>	23. Cock		58. Pullet
	24. Hen	<i>Any other Variety</i>	59. Cock
	25. Cockerel		60. Hen
	26. Pullet		61. Cockerel
<i>Buff</i>	27. Cock		62. Pullet
	28. Hen	DORKING—	
	29. Cockerel	<i>Coloured</i>	63. Cock
	30. Pullet		64. Hen
<i>White</i>	31. Cock		65. Cockerel
	32. Hen		66. Pullet
	33. Cockerel	<i>Silver Grey</i>	67. Cock
	34. Pullet		68. Hen
WYANDOTTE—			69. Cockerel
<i>Gold or Silver</i>	35. Cock		70. Pullet
	36. Hen		

¹ Given by the Proprietors of 'The Scottish Poultry News,' Aberdeen. The Bowl will become the property of the exhibitor who shall win it three times, not necessarily in succession. A Silver Medal will be awarded to the winner each year.

Special Entry Forms for Poultry Classes.

* See Regulations 66 and 67.

Class		DUCKS—continued		Class	
SOOTS DUMPY . . .	71. { Cock or	Orpington . . .	93. Drake	94. Duck	95. Drake
	72. { Cockerel				
	73. { Hen or				
INDIAN GAME . . .	74. Pullet	Indian Runner . . .	96. Duck	97. Drake	98. Duck
	75. Cock				
	76. Hen				
OLD ENGLISH GAME . . .	77. Cockerel	Any other Variety . . .	99. Gander	100. Goose	101. Cock
	78. Pullet				
	79. Cock				
BANTAM—	80. Pullet	GENSE . . .	102. Hen	103. { Pair of	Cockerels
	81. Cock				
	82. Hen				
Game . . .	83. Cock	Any pure Breed . . .	104. { Pair of	Pullets	105. { Pair of
	84. Hen				
	85. Cock				
Other than Game . . .	86. Hen	Game-Cross . . .	106. { Pair of	Pullets	107. { Pair of
	87. Cockerel				
	88. Pullet				
Any other recognised	89. Hen	Any other Cross . . .	108. { Pair of	Cockerels	109. { Pair of
	90. Pullet				
	91. Drake				
Breed . . .	92. Duck	(b) DUCKLINGS FOR TABLE	PURPOSES—	Any Breed or Cross	109. { Pair of
	93. Drake				
	94. Duck				
CROSS-BRED FOWLS FOR LAY- ING PURPOSES . . .	95. Hen	Any other Cross . . .	106. { Pair of	Pullets	107. { Pair of
	96. Pullet				
	97. Cock				
DUCKS—	98. Pullet	Any other Cross . . .	109. { Pair of	Ducklings	110. { Pair of
	99. Drake				
	100. Duck				

AMOUNT OF POULTRY PREMIUMS, £190, 15s.

Special Entry Forms for Poultry Classes.

* DAIRY PRODUCE

No Exhibitor to show more than one lot in any Class.

Entry Fees—Members, 5s.; Non-Members, 7s. 6d.

Class	Premiums.			
	1st.	2nd.	3rd.	
1. Powdered Butter, not less than 3 lb.	£	£	£	
2. Fresh Butter, three 1-lb. rolls	4	2	1	
	4	2	1	
3. Cheddar Cheese, 56 lb. and upwards—£6, £4, £2, £1				£14
4. Sweet-Milk Cheese, flat shape (from a dairy where all cheese is made flat shape), white in colour, made according to the Dunlop or other method—£4, £2, £1				18
5. Cheese, 14 lb. and under—£3, £2, £1				7
				6
				£40

Special Entry Forms for Dairy Produce.

* See Regulations 75 and 76.

* BEE APPLIANCES AND HONEY, &c. OPEN CLASSES.

APPLIANCES

Class	Entry Fees—2s. 6d. each.	Premiums.		
		1st.	2nd.	3rd.
1. Collection of Hives and Appliances, to include amongst other articles the following:—Three Standard Frame Hives complete, fitted with arrangements for supering. A suitable outfit for a beginner in Bee-Keeping (this to be staged separate from the main outfit). Prices—at which the exhibitor must agree to supply similar articles for six months—to be affixed to each article. Fifty superficial feet allowed for staging		80/-	40/-	20/-
2. Best and most complete Standard Frame Hive for general use, unpainted		20/-	15/-	10/-
3. Best and most complete Standard Frame Hive for Cottager's use, unpainted, price not to exceed 35/-		20/-	15/-	10/-
4. Any new Appliance connected with Bee-Keeping to which no prize has been awarded at any previous Highland show		10/-	5/-	-

HONEY, &c.

Entry Fees—2s. 6d. each.				
5. Six Sections of Comb Honey	20/-	15/-	10/-	
6. Six Jars of Run or Extracted Light-coloured Honey, approximate weight 6 lb.	20/-	15/-	10/-	
7. Six Jars of Run or Extracted Medium or Dark-coloured Honey, excluding Heather, approximate weight 6 lb.	20/-	15/-	10/-	
8. Six Jars of pressed Heather Honey in liquid form, approximate weight 6 lb.	20/-	15/-	10/-	
9. Six Jars of Granulated Honey, approximate weight 6 lb.	20/-	15/-	10/-	
10. One shallow frame of Comb Honey for extracting purposes	20/-	15/-	10/-	
11. Products made with the aid of Honey. Recipe to be attached	20/-	15/-	10/-	
12. Best display of Honey in any form staged in space 3 feet by 3 feet, height from table not exceeding 4 feet. Weight of honey not to exceed 100 lb.	60/-	30/-	20/-	
13. Best exhibit of not less than 1 lb. of Wax in any form	20/-	15/-	10/-	
14. Best exhibit of not less than 1 lb. of Wax made into shapes for retail trade and over-counter trade	20/-	15/-	10/-	
15. Observatory Hive with Queen and Bees	50/-	30/-	15/-	
Apis Club Silver Medal for best exhibit in Class 15.				
16. Exhibit of a scientific nature not mentioned in the foregoing classes, to which no prize has been awarded at any previous Highland Show	20/-	15/-	10/-	

(Confined to Scottish Exhibitors.)

17. Six Sections of Comb Honey	30/-	20/-	10/-
18. Six Jars of Run or Extracted Medium or Dark-coloured Honey, approximate weight 6 lb.	30/-	20/-	10/-
19. Six Jars of Run or Extracted Light-coloured Honey, approximate weight 6 lb.	30/-	20/-	10/-

The Rosebery Silver Medal will be awarded by the Scottish Bee-Keepers' Association to the winner of the greatest number of points in Honey Classes calculated on the following basis: 1st prize, 3 points; 2nd prize, 2 points; 3rd prize, 1 point.

The Apis Club Bronze Medal will be awarded to the winner of the second highest number of points. Winners must be at the time members or affiliated to the Scottish Bee-Keepers' Association.

PRIZE MONEY BY SOCIETY £43, 10s. 0d.
CONTRIBUTED BY SCOTTISH BEE-KEEPERS' ASSOCIATION . . . £10, 10s. 0d.

Special Entry Forms for Appliances and Honey.

* For Regulations as to exhibits see page 81.

W O O L

THREE *Fleeces* in each Entry and must be shown entire. Entry Fee, 5s.

PURE BREED CLASSES

Class							Premiums.		
							1st.	2nd.	3rd.
BLACKFACE.									
1. <i>Ewe</i> .	.	.	.	.	.	.	£	£	£
2. <i>Wedder</i> .	.	.	.	.	.	.	3	2	1
3. <i>Hogg</i> .	.	.	.	.	.	.	3	2	1
CHEVIOT.									
4. <i>Ewe</i> .	.	.	.	.	.	.	3	2	1
5. <i>Hogg</i> .	.	.	.	.	.	.	3	2	1
BORDER LEICESTER.									
6. <i>Ewe</i> .	.	.	.	.	.	.	3	2	1
7. <i>Hogg</i> .	.	.	.	.	.	.	3	2	1
HALF-BRED.									
8. <i>Ewe</i> .	.	.	.	.	.	.	3	2	1
9. <i>Hogg</i> .	.	.	.	.	.	.	3	2	1
*SHETLAND.									
10. <i>Ewe</i> .	.	.	.	.	.	.	3	2	1
11. <i>Hogg</i> .	.	.	.	.	.	.	3	2	1

TOTAL PRIZE MONEY FOR WOOL, £66.

Cheviot, Border Leicester, and Half-Bred Fleeces must be shown washed, and Blackface and Shetland Fleeces unwashed. All Fleeces must be shorn in the year of the Show from sheep bred and reared on, or regular stock of, the exhibitor's farm.

Special Entry Forms for Wool Classes.

* An exhibit of Shetland Wool may comprise fleeces of one or more colours, but each fleece must be self-coloured.

RURAL INDUSTRIES

Class.	<i>Entry Fees, 4s. each.</i>					<i>Premiums.</i>		
						1st.	2nd.	3rd.
	SHETLAND KNITTING.					£	£	£
1. Fine Goods . . . . .	.	.	.	.	.	3	2	1
2. Jumpers . . . . .	.	.	.	.	.	3	2	1
3. Other Exhibits . . . . .	.	.	.	.	.	3	2	1
	TWEEDS.							
4. Shetland . . . . .	.	.	.	.	.	3	2	1
5. Harris . . . . .	.	.	.	.	.	3	2	1
6. Other Homespun . . . . .	.	.	.	.	.	3	2	1
								£36

RURAL INDUSTRIES—continued.

Class	Miscellaneous.	Forward . . . £36		
		Premiums.		
		1st.	2nd.	3rd.
		£	£	£
7. Home-made Rug		3	2	1
8. Embroidery		3	2	1
9. Leather Gloves		3	2	1
10. Fur Gloves		3	2	1
11. Specimen of Furcraft other than Gloves		3	2	1
12. " Leather Work other than Gloves		3	2	1
13. " Hand-painted Pottery		3	2	1
14. " Basket Work (Rafia Baskets not eligible)		3	2	1
15. Bottled Fruit (bottled in or before 1921, 3 bottles)		3	2	1

£90

**Confined to Institutes and Members of Institutes in the South-Western
Area of Scottish Women's Rural Institutes.**

	Premiums.		
	1st.	2nd.	3rd.
	£	£	£
16. Home-cured Bacon or Ham (not less than 3 lb.)	3	2	1
17. Rug made from old material	3	2	1
18. Coloured Embroidery	3	2	1
19. Bed-cover	3	2	1
20. Knitted Jumper or Jersey	3	2	1
<i>No Entry Fee</i> —Special Prizes to the Institute winning the largest number of prizes in the Confined Classes. First Prize to count six points, Second Prize five points, Third Prize four points, V.H.C. three points, H.C. two points, and C. one point.			
	3	2	1
	£36		
PRIZE MONEY BY SOCIETY			£90
CONTRIBUTED BY THE SOUTH-WESTERN AREA			£36

NOTE.—No exhibit may be entered in more than one Class.

REGULATIONS.

1. The Competition, except where otherwise stated, is open to competitors from all parts of the United Kingdom. Societies or Institutes, as well as individuals, shall be allowed to compete.

2. Every exhibit must be the work either of the Exhibitor or of a member of the exhibiting Society or Institute.

3. An entry fee of 4s. for each exhibit is payable at the time of entry.

4. Exhibits will be received in the Showyard on Monday, the day before the opening of the Show, and up till 8 A.M. on Tuesday, the first day of the Show. Judging will commence at 9.30. A.M. on Tuesday. The section will be closed to the public during the judging. Exhibits shall not be removed till after the close of the Show.

5. Exhibits shall be entirely at the risk of exhibitors, who shall be solely responsible for delivery and removal of their own exhibits. In the event of neither the exhibitor nor a person with written authority from the exhibitor being present to place or remove exhibits, these will be placed and removed by men hired and paid by the Society; but this will be done on the understanding that the men are hired to do the work on behalf of the exhibitors and solely at their risk, and that the Society will be in no way responsible for expenses incurred or loss of or injury to exhibits by errors or accidents in placing, despatching, or conveying exhibits. A receipt signed by the exhibitor, on a form to be issued by the Secretary, must be delivered before any exhibit is handed over to the exhibitor or his or her representative.

6. Exhibitors shall be allowed to place with their exhibits a notice indicating where (in the Showyard or elsewhere) similar articles may be purchased.

Special Entry Forms for Rural Industries Section.

HORSE SHOEING

Open to Shoeing-Smiths from any part of the United Kingdom.

Horses provided for this Competition cannot be entered in any other Class.

Class.	THURSDAY, AT 10 A.M.	Premiums.			
		£	£	£	£
1. Farm or Work Horses (Open Class) . . .		5	3	2	1

FRIDAY, AT 10 A.M.					
2. Farm or Work Horses (Juniors under twenty-five years of age)		5	3	2	1
PRIZE MONEY BY SOCIETY				£22	
¹ CONTRIBUTED				£10	

¹ A piece of Silver Plate will be given by Messrs Neilson & Cleland, Coatbridge, to the winner of First Prize in each Class.

A Gold Medal will be given by the Mustad Nail Company for best-made Shoe in each Class.

1. Entries must be made with the Secretary not later than 1st June. Entry Fee, 2s. 6d. for each Class. Entry Forms may be had on application.

2. The Competition will take place in the Showyard, and will be decided by points, time being taken into consideration. Each Competitor must make and fix one fore and one hind shoe, having previously taken off the old shoes. The shoes must be fullered, with low calkins and toe-pieces, fore and hind. Each Competitor must bring his own tools, nails, and a striker. The striker will not be allowed to touch the horse's hoof. The local Blacksmiths' and Farriers' Association will provide forges, anvils, flat-iron, and fuel. The horses to be shod will be provided by these Associations. Forges and horses will be balloted for.

3. Any Competitor who does not attend at the Horse-Shoeing Stance and answer to his name at 10 A.M. on the day on which he is entered for competition, will be debarred from competing.

4. The Competitor and his striker will be admitted to the Yard free of charge on the day of Competition on presentation of tickets which will be sent to the Competitor for the purpose.

Special Entry Forms for Horse Shoeing Classes.

ABSTRACT OF PREMIUMS.

(Champion Medals given by THE EARL OF STAIR, D.S.O.)

GIVEN BY THE SOCIETY.

Cattle	£938	0	0
Horses	905	0	0
Jumping Competitions	147	0	0
Sheep	490	0	0
Goats	36	0	0
Pigs	285	0	0
Poultry	190	15	0
Dairy Produce	40	0	0
Bee Appliances and Honey	43	10	0
Wool	66	0	0
Rural Industries	90	0	0
Horse Shoeing	22	0	0
Medals to Breeders, &c.	20	0	0
Prizes for Timber ¹	20	0	0
	£3293	5	0

CONTRIBUTED PRIZES, CUPS, &c.

The Earl of Stair, D.S.O.—Champion Medals	33	0	0
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CATTLE.

*Mr William Duthie, Collynie, Tarves	£150	0	0
*Mr Emilio R. Casares, jun., London	50	0	0
The Shorthorn Society, and 2 Medals	40	0	0
Anonymous, for Shorthorns	22	0	0
*The late Sir George Macpherson Grant, Bart.	50	0	0
*The late Sir John Macpherson Grant, Bart.	50	0	0
Aberdeen-Angus Cattle Society	10	0	0
Fife and Kinross Perpetual Gold Challenge Cup	200	0	0
"Dr Gillespie" Memorial Challenge Trophy	50	0	0
Highland Cattle Society of Scotland	89	5	0
Cowhill Champion Cup	30	0	0
Ayrshire Cattle Herd-Book Society	20	0	0
British Friesian Cattle Society	63	0	0
Red Poll Cattle Society	27	0	0
Mrs Brown, Knockbrex	50	0	0
The Dun and Belted Galloway Cattle-Breeders' Association	28	0	0
Galloway Cattle Society of Great Britain and Ireland	36	0	0
	965	5	0

HORSES.

Renfrewshire Perpetual Gold Challenge Cup	£250	0	0
"William Taylor" Memorial Committee	10	0	0
Cawdor Challenge Cup	52	10	0
Hunters' Improvement and National Light Horse Breeding Society	10	0	0
Hackney Horse Society	10	0	0
Board of Agriculture for Scotland	40	0	0
National Pony Society	20	0	0
"Four Lovers of Breed" (Shetland Ponies)	10	0	0
Shetland Pony Stud-Book Society (Medal)			
	402	10	0

Carry forward	£4694	0	0
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¹ Grant to Royal Scottish Arboricultural Society for Prizes for Timber.

* Challenge Prizes.

ABSTRACT OF PREMIUMS—*continued*

Brought forward	.	.	.	£4694	0	0
SHEEP.						
Major Alexander Browne of Callaly Castle	.	.	.	£10	0	0
Dr F. A. E. Crew, University of Edinburgh	.	.	.	17	0	0
* Paisley Perpetual Gold Challenge Cup	.	.	.	300	0	0
Tweeddale Gold Medal	.	.	.	25	0	0
* Borthwick Challenge Cup	.	.	.	25	0	0
Society of Border Leicester Sheep-Breeders	.	.	.	20	0	0
* "Roberton" Challenge Cup	.	.	.	50	0	0
Oxford-Down Sheep-Breeders' Association	.	.	.	21	0	0
Suffolk Sheep Society	.	.	.	25	0	0
Mr Dugald M 'Kechnie, Glasgow	.	.	.	10	10	0
					503	10 0
GOATS.						
Board of Agriculture for Scotland	.	.	.	£12	0	0
* Lord Dewar	.	.	.	21	0	0
* Mrs S. M'Donald, Garrochty	.	.	.	10	0	0
					43	0 0
PIGS.						
National Pig-Breeders' Association	.	.	.	£20	0	0
British Berkshire Society	.	.	.	10	0	0
* Large Black Pig Society (Champion Cup £10, 10s., Cash £24)	.	.	.	34	10	0
* Gloucestershire Old Spots Pig Society (Trophy £42, Cash £15)	.	.	.	57	0	0
Cumberland Pig-Breeders' Association	.	.	.	20	0	0
					141	10 0
POULTRY.						
* Proprietors of 'The Scottish Poultry News,' Aberdeen	.	.	.		50	0 0
BEE APPLIANCES AND HONEY.						
Scottish Bee-Keepers' Association	.	.	.		10	10 0
RURAL INDUSTRIES.						
South-Western Area of the Scottish Women's Rural Institutes	.	.	.		36	0 0
HORSE SHOEING.						
Neilson & Cleland, Limited, Ceatbridge	.	.	.		10	0 0
Mustad Nail Co. (two Gold Medals).	.	.	.			
					£5488	10 0
* Challenge Prizes.						

JOHN STIRTON, *Secretary.*3 GEORGE IV. BRIDGE,
EDINBURGH, March 1922.

MEMBERS ADMITTED SINCE THE LIST WAS PUBLISHED IN APRIL 1921.

ARRANGED ACCORDING TO SHOW DISTRICTS.

ELECTED 1ST JUNE 1921 AND 4TH JANUARY 1922.

1.—GLASGOW DIVISION

ARGYLL

Admitted

- 1922 Campbell, Colin, of Jura, Jura House,
Argyllshire
1921 Duncan, George W., Kinlochspelve,
Craignure, Mull
1921 Laidlaw, Miss, c/o Watt, Torlin, Oban
1921 Lamont, John, Ardyne, Toward
1922 MacGillivray, Donald, Estate Manager,
Blarcreen, Ardrachattan
1922 MacGillivray, William, Blarcreen, Ardrachattan
1921 M'Innes, Miss, Ariogan, Oban
1922 Mackeand, Peter Alexander, Scour,
Bunessan, Mull
1921 MacLachlan, John A., Kinlochlaich,
Appin
1921 Maze, Mrs, of Achnacloch, by Connel,
Argyll
1921 Morris, Colonel D. O., of Killludine,
Drumlin
1922 Newton, Lieut.-Commander M. G., R.N.,
of Rahoy, Morvern
1922 Smith, Duncan, Auchallander, Bridge of
Orchy
1921 Taylor, James, The Home Farm, Ardgour

AYR

- 1922 Alexander, Andrew, Holmes Farm, Dry-
bridge, Kilmarnock
1922 Anderson, Andrew, Newbyre, Hurlford
1922 Auchmuty, John, Alticane, Pinwherry
1921 Corbett, The Hon. T. G. P., Rowallan,
Kilmarnock
1922 Dinning, Thomas, Auchenwinzie Farm,
Irvine
1922 Finnie, John, Campbell, Dalry
1922 Goldie, Thomas, Old Hall, Irvine
1921 Hannah, John James Miller, Girvan
Mains, Girvan
1921 Hodge, Robert, Loudoun Mains Farm,
Newmilns
1922 Howie, James (Robert Howie & Sons),
Dunlop
1921 Howie, Thomas, Fulshaw Wood, Ayr
1922 Kelly, William, 6 Belleisle Cottages,
Alloway
1921 Littlejohn, Robert, Genoch Farm, Ayr
1922 Logan, William, South Craig, Holly-
bush, Ayr
1922 M'Gill, James, North Millburn, Mont-
greenan, by Kilmarnock
1922 Matthew, John M., Girthill, Saltcoats
1922 Morton, Robert, Townhead, Newmilns

- 1922 Ramsay, William M., East Carnegillan,
Tarbolton
1922 Rawson, Walter Amos, Secretary, Craigie
Farmers' Society, Craigie, by Kilmarnock
1922 Robertson, Mrs G., Sandhills, Monkton
1922 Smith, William, Whatriggs, Riccarton,
Kilmarnock
1922 Tennant, James R., Tour Gardens, Kilmaurs
1922 Tytler, William, Doggartland Estate
Home Farm, Dalry
1921 Walker, William, Mossdale, Dalmeilington
1922 Woodburn, Alexander, Barwehys,
Mauchline
1922 Woodburn, Andrew, Holchouse, Galston
1922 Woodburn, Hugh, Killoch, Galston
1922 Wylie, George D., Glasscock Farm,
Fenwick, Kilmarnock

BUTE

- 1921 Cowan, Douglas L., Grenach Farm,
Rothesay
1922 Currie, Duncan, Crossbeg Farm, Rothesay
1922 Dickie, John, Cranselgavourity Farm,
Rothesay
1922 Duncan, Ninian, Little Kilmory, Rothesay
1922 Haggie, Robert, Farm Manager, Brodick,
Isle of Arran
1922 Lyon, Alexander, Barefield Farm,
Rothesay
1922 M'Alister, Archibald, Meikle Kilmory,
Rothesay
1922 Martin, John, Ardnahoe Farm, Rothesay
1922 Montgomery, James, Auchinteerie,
Rothesay
1921 Turnbull, John W., Factor, Ardlamont,
Kilbride House, Millhouse, Kyles of
Bute

LANARK

- 1921 Alexander, Archibald, Fountainwill
Road, Townhead, Glasgow
1921 Alexander, James, Fountainwill Road,
Townhead, Glasgow
1921 Anderson, John S., c/o Henry Pooley &
Son, Ltd., 69 M'Alpine Street, Glas-
gow
1922 Ballantyne, John, Woods Farm, Auch-
enheath, Lanarkshire

1922 Barbour, Matthew, 587 Alexandra Parade, Glasgow
 1921 Barr, William, Hawksland Farm, Lesmahagow
 1921 Beaton, James, Neshanie, Brakenbrae, Bishopbriggs
 1921 Best, Harrower, Maidencots, Abington
 1922 Blackwood, Thomas M., 4 Lorne Terrace, Maryhill
 1921 Blain, James (James Blain & Co.), 41 Ann Street, Glasgow
 1922 Bryson, Thomas C., Turnlaw Farm, Cambuslang
 1922 Cairns, John, 89 Mitchell Street, Glasgow
 1922 Clark, Robert, High Possill Farm, Lambhill
 1922 Cleland, James, Shieldhall Farm, Govan
 1922 Clews, David, 26 Whitehill Street, Dennistoun, Glasgow
 1921 Cowan, Andrew, Woodend, Abington
 1921 Craig, Thomas, 23 Clifford Street, Ibrox, Glasgow
 1922 Cranstoun, Lieut.-Colonel C. J., Edmondstoun, Corehouse, Lanark
 1921 Davie, Alexander, F.S.I., Valuation Department, Inland Revenue, 84 Miller Street, Glasgow
 1921 Dickson, R. Y., Agricultural Engineer, 144 Castle Street, Glasgow
 1921 Donaldson, J. A., 82 St Vincent Street, Glasgow
 1921 Dunlop, Robert, 12 Crown Terrace, Glasgow
 1922 Duncan, Alexander, Moss Farm, Govan
 1922 Findlay, John, jun., Springhill, Baillieston
 1921 Fraser, J. Gibson, jun., Springhill House, Douglas
 1921 Fraser, Newbie, Springhill House, Douglas
 1921 Gilmour, Archibald G., Crosshill, East Kilbride
 1921 Gilmour, Arthur, 11 M'Farlane Street, Glasgow
 1921 Gilmour, John, South Alderston Farm, Bellshill
 1921 Graham, James C. (W. & A. Graham), 7A Killermont Street, Glasgow
 1922 Gray, Alexander, Damhill, Kirkfieldbank, Lanark
 1922 Hamid, Abdul, The University, Glasgow
 1922 Hastie, David, Eddlewood, Hamilton
 1921 Hood, P., Farm Manager, Kirklands Asylum, Bothwell
 1921 Hunter, Andrew, 146 Buchanan Street, Glasgow
 1921 Jardine, Robert, Huntlyhill Mains, Lanark
 1921 Kerr, Robert, Secretary, Lanarkshire Agricultural Executive Committee, 85 High Street, Lanark

1922 Lealie, Charles, Udston Farm, Hamilton
 1921 M'Leod, Hector (Galloway & M'Leod, Ltd.), 219 St Vincent Street, Glasgow
 1921 M'Nair, Donald, Viewpark Farm, Uddingston
 1922 Martin, John, 2 Hillhead Road, Cardonald, Glasgow
 1921 Miller, John, North Alderston, Bells-hill
 1922 Murdoch, Alan, Culter House, Coulter, Lanarkshire
 1921 Murdoch, John, New Mill, Hartwood
 1921 Orr, George, Stane Farm, Shotts
 1921 Rae, George (Lawes Chemical Manure Co., Ltd.), 118 Queen Street, Glasgow
 1921 Ramsay, Thomas M., 2 Main Street, Shotts
 1921 Ritchie, Charles James, 62 Robertson Street, Glasgow
 1921 Russell, John, Eastend, Carstairs
 1922 Scott, Robert, Swinsie Cottage, Cleland
 1922 Semple, Alexander, South Netherburn, Ashgill, Lanarkshire
 1922 Smith, William, Blackbog, Quarter
 1921 Soular, Stanley C., 87 Berkeley Terrace, Glasgow, W.
 1921 Steel, William, Righead Farm, Bells-hill
 1921 Stewart, John C., yr. of Murdostoun Castle, Newmains
 1922 Strang, William, The Peel, Busby
 1922 Strang, William Fleming, 24 George Square, Glasgow
 1921 Torrance, Abraham, Crookedstone, Quarter
 1921 Torrance, John, Knowetop, Quarter
 1922 Weir, Robert W., Implement Maker, Strathaven

RENFREW

1921 Allan, J. Downie, Beaumais, Bridge of Weir
 1922 Beardsley, John Birch, 51 Glencairn Drive, Pollokshields
 1921 Black, John, Auchentfoyle, Kilmacolin
 1922 Chassels, James R., Byram House, 116 Maxwell Drive, Pollokshields
 1921 Howie, Hugh, Finnockbog Farm, Inverkip
 1921 Howie, Thomas, Finnockbog Farm, Inverkip
 1922 M'Gregor, Thomas, Organiser S.F.S.U., Victoria Road, Nitshill
 1922 Maxwell, Miss Ann Stirling, Pollok House, Pollokshaws
 1921 Paterson, William, J.F., St James Terrace, Kilmacolin
 1922 Reid, Alexander, Old Bishopton, Bishopston

2.—PERTH DIVISION

FIFE

1921 Aitken, James, Thistle Street Dairy, Dunfermline
 1922 Anderson, John, Templehall Farm, Burntisland
 1922 Arnot, David, Weddersbie, Colleslie
 1922 Banks, Edward, Pitcadie, Kirkcaldy
 1921 Baxter, John M'Nee, Brucefield Farm, Dunfermline
 1922 Bell, David Arnot, Push, Leuchars

1922 Berwick, Thomas, Headwell Farm, Dunfermline
 1921 Cadzow, Andrew F., Blacketyside, Leven
 1922 Cook, Andrew, Bankhead, Thornton
 1922 Donald, Robert, Lilliehill, Dunfermline
 1922 Drybrough, T. Greenlees, Orkie, Freuchie
 1921 Duncan, John, Cornhill, Colleslie
 1922 Eckford, Alexander Herbert, Mavis Haugh, St Andrews

1922 Ferguson, William, Newtown Dairy, Kirkcaldy
 1922 Forayth, Thomas, Bankhead, Raith, Kirkcaldy
 1922 Fotheringham, William, West Saline, Oakley
 1921 Haig, Captain John A., Lawfield Farm, Ladybank
 1921 Harley, John, Pitbauchlie Farm, Dunfermline
 1922 Hutcheson, Arthur, Greenside, Leven
 1921 Kyle, Thomas Watson, c/o Mr J. Clement, Balkaithly, Stravithie
 1921 Miller, Alexander, "New" Victoria Hotel, Dunfermline
 1922 Mitchell, James Fleming, Easter Lotherisk, Ladybank
 1921 Ogilvie, James, Keirs, Largo, Fife
 1922 Reid, Thomas, West Finglassie, Leslie
 1922 Roger, William, Cassindonald, St Andrews
 1921 Scott, John, 25 High Street, Dunfermline
 1922 Scott, Peter, Market Gardener, Drumeldrie, Largo
 1921 Taylor, John, jun., Levenmouth Farm, Leslie
 1922 Todd, James, Denmuir, Newburgh-on-Tay
 1922 Weir, D. M., Orkie, Freuchie
 1922 Wilson, John, Mains of Beath, Crossgates
 1921 Wilson, William, Redvers Oak, Transy Place, Dunfermline
 1922 Young, Matthew, Glenfoyle, Auchtertool

FORFAR

(WESTERN DISTRICT)

1921 Black, Charles, Manager, Baldovan Home Farm, by Dundee
 1922 Christie, James, Washingdales, Kincaldrum, by Forfar
 1922 Cowpar, John M'Kenzie, Over Migvie, Kirriemuir
 1921 Findlay, James, New Miln, Craigessie, by Forfar
 1921 Ford, John (Ford & Paterson), 344 & 346 Brook Street, Broughty-Ferry
 1921 Hood, James S., "Lynwood," 1 Campdown Road, Downfield, Dundee
 1921 Inglis, T. M., M.R.C.V.S., Ingleside, Forfar
 1921 Murdie, John, jun., Bagxerton, Forfar
 1921 Nicoll, Alex., Mill of Brighty, by Dundee
 1921 Prain, Alex. S., Longhagh Farm, by Dundee
 1922 Pullar, Robert, 6 Osborne Place, Dundee
 1921 Robbie, Andrew, Nether Bow, Forfar
 1921 Seaton, John C., Birkenbush, Forfar

1922 Thomson, Robert Lindsay, Ancrum Cottage, Lochee
 1921 Walker, Alexander, Quilkoe, Forfar
 1921 Whyte, James L., Hayston, Glamis
 1921 Whyte, Patrick, Hatton of Eassie, Glamis

KINROSS

1921 M'Kechnie, Hugh, Wood of Coldrain, Kinross
 1921 Williamson, James, East Lochran, Blairadam

PERTH

(PERTH SHOW DISTRICT)

1922 Anderson, James, jun., Ballinloan, Strathbraan, Dunkeld
 1921 Brand, Alexander, Milton Forteviot, Forgandenny
 1921 Brown, David Robertson, The Hotel, Abernethy
 1922 Bruce, John, jun., 11 Muirhall Terrace, Perth
 1921 Campbell, Donald, Slatich Farm, Glenlyon, Aberfeldy
 1921 Campbell, Duncan, Balinloan, Glenlyon, Aberfeldy
 1922 Coates, David A., Solicitor, 10 Blackfriars Street, Perth
 1921 Cox, Maurice C., Balcraig, Scone
 1922 Drummond, Peter M., Cherrybank, Perth
 1921 Fenwick, James (Lindsay & Fenwick), Ironmongers, Perth
 1922 Forbes, Alexander, Balgonie Farm, Abernethy
 1921 Fyffe, Robert B., 35 Rose Crescent, Perth
 1921 Grant, H. Mitchell, F.S.I., Bengarthy, Blairgowrie
 1922 Kyd, John N., Pitcastle, Strathtay
 1921 M'Dougall, John, Denmarkfield, Perth
 1921 M'Farlane, John, Kinloch, Amulree, Glenquich, Perth
 1922 Main, Benjamin, Agricultural Merchant, 1 King Edward Street, Perth
 1921 Mellis, John, Shian Bank, Scone
 1922 Nicoll, Harold, Nether Logie, Meigle
 1922 Provan, John, Wallacetown, Bridge of Earn
 1922 Provan, William, Wallacetown, Bridge of Earn
 1921 Rose, George R., Ballechin, Ballinluig
 1922 Shanks, T. B., Mains of Kinmonth, Bridge-of-Earn
 1922 Stark, H. M., Balhepburn, Bridge of Earn
 1922 Walter, Captain C. H., Chesthill, by Aberfeldy
 1922 Walter, Mrs C. H., Chesthill, by Aberfeldy

3.—STIRLING DIVISION

CLACKMANNAN

1921 Cairns, Thomas E., 1 Bedford Place, Alloa
 1922 Congalton, William, Burnbrae Lodge, Dollar
 1921 Dawson, John, Menstrie Mains, Menstrie

1921 Finlayson, Thomas, 31 Elphinstone Street, Kincardine-on-Forth
 1921 Fleming, Andrew, Bankhead, Alloa
 1921 M'Gregor, A., Braehead Farm, Cambus
 1922 Stevenson, William, Glenhead, Glen-devon, by Dollar

DUMBARTON.

- 1922 Andrew, G., Renton, Dumbartonshire
 1921 Christie, Major George H., D.S.O.,
 Levenfield, Alexandria
 1921 Howie, Robert, jun., Drumfork Farm,
 Helensburgh
 1921 MacVey, James, Duchlage, Couplort,
 near Cove
 1921 Snodgrass, J. Cecil, Millig, Helens-
 burgh
 1922 Stevenson, Alexander, Maryville, Dum-
 barton
 1922 Stewart, Alexander, Arden Cottages,
 Arden, Balloch
 1921 Stirling, Robert, Mid Forrest Farm,
 Cumbernauld
 1922 Walker, Thomas, Duchlage Farm, Luss
 1922 Wilson, John M., Garshake, Dumbarton

PERTH**(STIRLING SHOW DIVISION)**

- 1921 Beveridge, Rev. J., B.D., M.B.E., The
 Manse, Gartmore
 1922 Crawford, Hugh, sen., Daldorn, Doune
 1922 Crawford, Mrs. Daldorn Farm, Doune
 1921 Finlayson, Malcolm, jun., Mid-Lundie,
 Doune
 1921 Fisher, Daniel, Tarr Farm, Ruskie
 1921 Fisher, James, Tarr Farm, Ruskie
 1921 Gow, David, Ballochargie Farm, Crieff
 1921 Grahame, Monteith James Hill, Glenly,
 Port of Monteith
 1921 Henderson, Archibald, Balabeg, Port of
 Monteith
 1921 Kirk, John James, Stonehill, Dunblane
 1921 Kirk, Robert, Stonehill, Dunblane
 1921 Laird, David, Waterside, Dunblane
 1921 MacCall, Daniel, Kirklane, Blair Drum-
 mond
 1921 M'Caull, Peter, Braehead, Dunblane
 1921 M'Inroy, William, Gowanbrae, Dunblane
 1921 M'Intyre, James, Hilden, Auchterarder
 1922 M'Lauchlan, James, Daldorn, Doune
 1921 M'Naughton, Thomas, Lower Whiteston,
 Kinbuck
 1921 Marshall, Richard, Baad Farm, Gart-
 more
 1921 Maxwell, William, Kirklane, Blair Drum-
 mond
 1921 Menzies, Lorn, Keir Gask, Auchter-
 arder
 1921 Muir, Sir A. Kay, Bart., of Blair Drum-
 mond, Perthshire
 1921 Muirhead, James, Briarlands, Blair
 Drummond
 1921 Peterkin, William Bruce, Kingshouse,
 Balquhiddier
 1921 Prentice, Thomas, Knapplands, Mut-
 hill
 1921 Richardson, James G., Hutcheson, Dun-
 blane
 1921 Robertson, James, East Biggs, Black-
 ford
 1921 Rogerson, Miss Bertha Stanley, Rokeby,
 Dunblane
 1921 Scott, James, Portend, Port of Monteith
 1922 Scougall, David, Hilton of Cardross,
 Port of Monteith
 1922 Scougall, P. M'K., Hilton of Cardross,
 Port of Monteith
 1921 Sharp, John, Mid Fordoun, Auchterarder
 1922 Stewart, James, Laggan, Strathyre
 1922 Stewart, Mrs. Millhills, Crieff
 1921 Stewart, Robert, Royal Hotel, Tyndrum
 1922 Stirling, Captain Archibald, of Garden,
 Port of Monteith Station
 1921 Walker, Peter, Clachaig, Killin

- 1921 Wilson, Robert, Strathie, Auchterarder
 1922 Young, John, Glenwhilk, Dunblane

STIRLING

- 1921 Adam, Henry, 19 Wallace Street, Stirling
 1921 Adam, John, Muirpark, Denny
 1921 Adam, Thomas, Wester Greenyards,
 Bannockburn
 1921 Addison, John B., Candie Farm, Avon-
 bridge
 1922 Addison, Steve, Auctioneer, 4 Queen
 Street, Stirling
 1922 Allison, James, Maple House, Bridge of
 Allan
 1922 Anderson, John, 6 Allan Park, Stirling
 1921 Archibald, Major James R., 29 Snowdon
 Place, Stirling
 1921 Auld, Andrew, 21 Glebe Avenue, Stirling
 1921 Baird, Alexander A., Birchfield, Falkirk
 1921 Boyd, Robert, Dougal's Hill, Airth, by
 Stirling
 1921 Brown, William M., Dalderse Farm,
 Falkirk
 1921 Buchanan, Andrew, Abercromby Place,
 Stirling
 1921 Cairns, John, West Plean Farm, Plean
 1921 Calder, Alex., jun., Drumfold, Avon-
 bridge
 1921 Calder, Jack, 2 Albert Place, Stirling
 1922 Caldwell, William, Hillhead Farm,
 Drymen
 1921 Campbell, Hugh, Carron House, Carron-
 shore, Falkirk
 1921 Carawell, Robert, Dykes, Stirling
 1921 Christie, A., Back o' Muir, Bannockburn
 1921 Christie, James, jun., Cowiehall Farm,
 Cowie, Bannockburn
 1921 Christie, Robert, 9 Glebe Crescent,
 Stirling
 1921 Christie, Roy, Craigs, Stirling
 1921 Christie, William, Newpark, Stirling
 1921 Christie, William, Sauchie Home Farm,
 Stirling
 1921 Clarke, William, Swiss Cottage, Dun-
 more
 1921 Cochran, Mungo, Balmoral Place,
 Stirling
 1921 Cowan, William, Balquhiddierock, Ban-
 nockburn
 1921 Cox, D. R., Road Surveyor, The En-
 closure House, Stirling
 1921 Crawford, Andrew, Cambuskenneth,
 Stirling
 1921 Crawford, Henry, Cambuskenneth,
 Stirling
 1921 Cullens, James, Port Street, Stirling
 1921 Cullens, James, jun., Drummond Place,
 Stirling
 1921 Cuthbert, William, 18 Park Crescent,
 Stirling
 1921 Cuthill, David, Drip Bridge, Stirling
 1921 Dewar, Andrew, Solicitor, Barnton
 Street, Stirling
 1921 Dewar, Robert, Kildean Cottage, Stirling
 1921 Dick, David, L.D.S., Melville Terrace,
 Stirling
 1921 Dickie, Israel, Golden Tractor & Motor
 Works, Murray Place, Stirling
 1921 Dow, John, Raploch, Stirling
 1921 Duncan, Joseph F., Secretary, Scottish
 Farm Servants' Union, Queensgate,
 Stirling
 1921 Duncanson, James, 15 Abercromby
 Place, Stirling
 1921 Eadie, John, Blair Mains, Blairlogie
 1921 Eadie, Ronald, Blair Mains, Blairlogie
 1921 Farquhar, Arthur Heriot, Potato Mer-
 chant, 1 Park Terrace, Stirling

- 1921 Galloway, Major Gilmour, Drimfearn,
Chalton Road, Bridge of Allan
1921 Gardner, William, Gartentrnoch, Buch-
lyvie
1921 Gellan, Alexander, Dunmore Park,
Larbert
1921 Gilmour, J. H., 5 Park Avenue, Stirling
1921 Graham, James A., Laraben, Kippen
Station
1922 Graham, R. S., Butcher, Falkirk
1921 Haddow, John, Tombrake Farm, Balfon
1921 Hain, David J., 1 Millar Place, Stirling
1921 Henderson, Duncan, Burnbank, Throsk,
Stirling
1921 Hendry, Andrew, Greenwells Farm,
Shieldhill, by Falkirk
1921 Howie, John Currie, Carbeth Home
Farm, Balfon Station
1921 Inglis, John, Patrickston, Gargunnoch
1921 Irvine-Robertson, Duncan, Glenelm,
Stirling
1921 Jaffray, Hugh, Kaimes, Stirling
1921 Jenkins, George R., Glebs Avenue,
Stirling
1921 Johnston, William, Newmills, Stirling
1921 Karrigan, Matthew, Rosewell, Gargun-
noch
1921 Kilpatrick, George T., 64 Murray Place,
Stirling
1921 Kinross, William, 13 Clarendon Place,
Stirling
1921 Lang, Andrew, Grain Merchant, Falkirk
1921 Lawson, W. Scott, Castleview, Stirling
1921 Letham, William, Woodend, Buchlyvie
1922 Lennox, W. G. P. Kincaid, of Lennox
Castle, Lennoxtown
1921 Lucas, James, Ladyneuck, Stirling
1921 Lupton, Thomas, Solicitor, 16 Aber-
cromby Place, Stirling
1921 M'Allister, John, Timber Merchant,
St Ninians, Stirling
1921 M'Culloch, Reginald, Myreton, Stirling
1921 M'Dermont, James, 27 Forth Crescent,
Stirling
1921 M'Diarmid, Duncan, Candleworks, Stir-
ling
1921 M'Donald, Coll., Pendreich, Bridge of
Allan
1921 M'Ewen, Daniel, jun., Allan Park, Stir-
ling
1921 M'Ewen, James, Hillhead, Cambus-
barron
1921 M'Fadyen, Dr Peter, Park Avenue,
Stirling
1921 M'Farlane, Andrew C., Dripend, Stirling
1921 M'Kerracher, John, 28 Union Street,
Stirling
1922 M'Kerracher, Robert, Hardieston, by
Kippen
1921 M'Millan, James, Cornton Vale, Bridge
of Allan
1921 M'Nee, Thomas, Nicolton Farm, Pol-
mont
1921 M'Queen, Samuel, Glendarroch, Kippen
1922 Mailer, Daniel MacIntyre, Ladylands,
Kippen
1922 Mailer, John, Ladylands, Kippen
1921 Meikle, Robert, Riskend Farm, Kilsyth
1921 Meikle, Robert W., Bearcrofts, Grange-
mouth
1921 Miller, D., Dairyman, Bannockburn
1922 Mitchell, Archibald, Waterslap, Airth,
Larbert
1921 Moir, Andrew, Nethercarse, Gargunnoch
1921 Moir, George, Nethercarse, Gargunnoch
1921 Monteath, Alexander, Royal Hotel,
Bonnybridge
1921 Moores, Baillie David, 49 Wallace Street,
Stirling
1921 More, Buchanan, Fordhead Farm,
Kippen
1921 More, David, Mains of Boquhan, Kippen
Station
1922 More, Henry, Woodyett, Gargun-
noch
1921 Muirhead, James Marshall, Greenocks,
Bridge of Allan
1921 Muirhead, William, Pirnhall, Bannock-
burn
1921 Nairn, P. D., Dalmorglen Park, Stirling
1921 Nairn, William, Allan Park, Stirling
1921 Parker, H. J., Drummerchen, Kippen
1921 Parlane, William, Offraunce, Buchlyvie
1921 Paterson, John, Southfield, Kippen
Station
1921 Paton, D., Glenside, Plean, Bannock-
burn
1921 Peattie, H. W., North Third, Cambus-
barron, Stirling
1921 Primrose, John Ure, Dalranoch, Bridge
of Allan
1921 Primrose, Rev. Robert, Dalranoch,
Bridge of Allan
1921 Richardson, Francis, Blairforkie, Stir-
ling
1921 Sanderson, John Martin, Drumbrae,
Bridge of Allan
1921 Sanderson, William Norman, Drumbrae,
Bridge of Allan
1921 Scott, Arthur, Drummond Place, Stir-
ling
1921 Scott, David, Bellfield, Stirling
1921 Shanks, James, Mydub, Denny
1922 Semple, Thomas, Colbeg Farm, Balmore,
Stirling
1922 Smith, George, Hotelkeeper, Crown
Hotel, Airth, Larbert
1921 Smith, Watt J., Cockspow Farm, Stirling
1921 Starkey, George, Dalmorglen Park,
Stirling
1921 Strang, Gavin, Bensfield, Carron
1921 Strang, James, Stuarthall, Stirling
1922 Steel, John, Ballaird, Balfon
1922 Stewart, Andrew, Cashley, Buchlyvie,
Stirling
1922 Sutherland, Miss M. E., Organiser
S.F.S.U., Queensgate, Stirling
1921 Taylor, William, Inveravon Farm, Pol-
mont
1921 Thomson, John, Nyaad, Stirling
1921 Thomson, William, Estates Office, Pol-
maise, Stirling
1921 Tod, James, Netherby, Stirling
1921 Turnbull, Hugh S., Lilliards, Bridge of
Allan
1921 Turnbull, Robert, Thirladene, Bridge of
Allan
1921 Walker, Robert, Wester Carmuir,
Larbert
1922 Watt, Archibald, jun., Whitehouse
Farm, Carso, Stirling
1921 Westcott, William S., Castle View, The
Abbey, Stirling
1921 Young, John, 11 Clarendon Place, Stir-
ling
1921 Young, Robert, Carat Farm, Stirling
1921 Young, Thomas, 11 Clarendon Place,
Stirling

4.—EDINBURGH DIVISION**EDINBURGH**

- 1922 Baird, Archibald William, Veterinary Surgeon, 40 York Place, Edinburgh
 1921 Blackburn, Major Thomas, O.B.E., Edinburgh and East of Scotland College of Agriculture, 13 George Square, Edinburgh
 1922 Brown, W. Slater, C.A., 45 Queen Street, Edinburgh
 1921 Clark, Colin Fraser M'Duff, Torwood, Colinton
 1921 Crew, F. A. E., M.B., Institute of Research in Animal-breeding, High School Yards, Edinburgh
 1921 Douglas, David, Board of Agriculture for Scotland, 29 St Andrew Square, Edinburgh
 1922 Erskine, Hugh, South Myre, Craigmillar
 1922 Gibson, William N., Lauriston Farm, Davidson's Mains
 1921 Gunn, Alexander, Fairhaven, Colinton
 1921 Gunn, Roy Hamilton, 12 Downie Terrace, Murrayfield
 1921 Havery, William, 15 Moat Place, Edinburgh
 1922 Knox, M. Allan, University Union, Edinburgh
 1922 Lyon, James, c/o Messrs Dobbie & Co., Limited, Edinburgh
 1922 M'Gowan, John Pool, M.D., 2 Lockharton Gardens, Edinburgh
 1922 Maule, Sir Robert, Ashbrook, Edinburgh
 1922 Munro, Miss F. Gladys, Hillwood, Ratho Station
 1921 Purves, John Jarvie, 6 Hermitage Drive, Edinburgh
 1921 Ramsay, A. B. Wardlaw, Whit-hill, Rosewell
 1921 Shepherd, William, F.S.I., Valuation Department, Edinburgh Counties, 53 Hanover Street, Edinburgh
 1922 Taylor, John, M.R.C.V.S., 12 Bread Street, Edinburgh
 1921 Walker, Douglas Grahame, 12 Greenhill Terrace, Edinburgh

- 1922 Walker, Robert, Newfarm, Midcalders
 1922 Watt, James G. (Messrs Philip, Maxwell, & Watt), Grain Merchant, Leith (8 Wellington Street, Portobello)
 1921 Whiteley, Ernest Stelling, 84 St Andrew Square, Edinburgh
 1922 Wood, George, Dairyman, Jock's Lodge, Edinburgh
 1921 Wood, Robert, Corshope, Heriot

EAST LoTHIAN

- 1921 Blair, Mrs C., Hoprig Mains, Gladsmauir
 1922 Clark, J. G. D., Luggate, Prestonkirk
 1922 Cowe, John, West Garleton, Haddington
 1922 Cunningham, Howard Usher, Hedderwick Hill, Dunbar
 1922 M'Call, Alexander, Organiser S.F.S.U., Brown's Place, East Linton
 1922 M'Gibbon, J. B., Saltoun Estates Office, Pencoatland
 1922 Main, James, Saltoun Home Farm, Pencoatland
 1922 Shields, Mrs, Dolphinstone, Tranent
 1921 Simpson, Richard Charles (John Swan & Sons, Ltd.), Haddington
 1921 Thomson, Alexander James, Belmont, Haddington
 1922 Wolfe, Charles R., Saltoun Barley Mill, Pencoatland

WEST LoTHIAN

- 1922 Baxter, Thomas, Woodbank, Armadale
 1921 Bryers, John, Drumbeig Farm, Blackridge
 1921 Cochran, Archibald, Bellevue, Linlithgow
 1921 Frame, Charles, jun., Birdsmill, Broxburn
 1921 Frame, James, Birdsmill, Broxburn
 1922 Johnstone, Andrew, Woodhead, Linlithgow
 1922 Meikle, James, Rousland Farm, Linlithgow

5.—ABERDEEN DIVISION**ABERDEEN**

- 1921 Anderson, Sylvester D., Union Bank of Scotland, Turriff
 1921 Chessor, George Clinton, Assistant Factor, Claremont, Victoria Street, Fraserburgh
 1921 Clark, Graham, Ashbank, Aberdeen
 1922 Cleghorn, Major Alexander, Drumroisie, Inch
 1921 Cran, James, Boghead, Drumblade
 1922 Cruickshank, A. B., Kinbog, Fraserburgh
 1921 Farquhar, John, Marchlands, Boyndlie, Fraserburgh
 1922 Farquharson, Norman D., of Whitehouse, Whitehouse, Tough, Aberdeenshire
 1922 Findlay, John, Mains of Lohrston, Nigg, by Aberdeen
 1921 Fowler, Alexander, Boynds, Inverurie

- 1921 Fraser, Miss Mary, North of Scotland College of Agriculture, Craibstone, Bucksburn
 1922 Graham, John, J.P., Managing Director, Campbells, Ltd., 15 Bon Accord Street, Aberdeen
 1922 Gray, Alexander, Meikle Bogs, Rothiemoran
 1921 Haddo, EARL OF, Haddo House, Aberdeenshire
 1922 Irvine, George, Todlachie, Monymusk
 1922 Jack, William, Organiser S.F.S.U., 48 Orchard Street, Aberdeen
 1921 Mitchell, William, Altonrie, Glenmuick, Ballater
 1921 Morrice, George, Marystone, Strichen
 1921 Morrison, Peter, Broomfold, Drumblade, by Huntly
 1921 Park, James, Overhill, New Pitaligo, Aberdeen

- 1922 Rennie, Lewis G., Upper Kinghorn,
Newmachar
1921 Robertson, Mrs Thomas, Aquithie, Kem-
nay
1921 Sandison, Alexander, Huntly Arms
Hotel, Aboyne
1921 Shewan, James, Uppermain, Echt
1922 Sinclair, David, Lorrston, Aberdeen

BANFF

- 1921 Cameron, William, Catherinebraes,
Craigellachie
1921 Hay, Alexander George Petrie, Edin-
tore, Keith
1921 M'Kay, William, Engineer, Aberchirder
1922 M'Kenzie, George, Bogierow, Portsoy
1921 Shaw, James, Ladycroft, Craigellachie

FORFAR

(EASTERN DISTRICT)

- 1921 Bell, James, Gilchorn, Inverkeilor,
Arbroath

- 1922 Denholm, C. M., Southesk Estate Office,
Forebank, Brechin
1922 Duke, David Edward, St Ninian's,
Brechin
1922 Easson, Alexander, Barry Mills, Car-
noustie
1922 Spence, Andrew, jun., Commieston,
Montrose
1921 White, James, Hospitalshields, St
Cyrus, Montrose

KINCARDINE

- 1922 Hunter, William, Redcloak, Stone-
haven
1922 Milne, David, Mill o' Forrest, Stone-
haven
1922 Paterson, William, Atholl Cottage,
Robert Street, Stonehaven
1922 Reid, Alexander Percy, Pitgarvie,
Laurencekirk

6.—DUMFRIES DIVISION

DUMFRIES

- 1921 Adams, George, Westwater, Langholm
1922 Aird, Robert, Kirkpatrick Hill, Close-
burn, by Thornhill
1922 Aitchison, Andrew, Old Irvine, Canonbie
1922 Alexander, J. W., of Newton, M.V.O.,
Moffat
1922 Armstrong, James, Castlehill, Lockerbie
1922 Armstrong, James, Greenburn, Canonbie
1922 Armstrong, Robert, Beckfoot, Annan
1922 Austin, James, Kilblain, Bankend,
Dumfries
1922 Barbour, James, jun., Tinwald Parks,
Dumfries
1922 Barker, John, Uplands, Edinburgh
Road, Dumfries
1922 Beattie, A. O., Dornock Mills, Eastriggs,
Annan
1922 Beattie, T. L., Solway House, Rigg,
Gretna
1922 Bell, George, Orchard, Canonbie
1922 Bell, Rachel E., Torbeckhill, Waterbeck,
Lockerbie
1922 Bell, Thomas, Bruntshielbog, Canonbie
1922 Bell, W. A., of Castle O'er, Langholm
1922 Blacklock, John, Hoddamtown, Eccle-
sechan
1922 Boyd, William, Clarencefield, Ruthwell
1922 Boyen, James, Newfield, Annan
1922 Boyes, James, jun., Newfield, Annan
1922 Bramwell, Archibald C., Drumbule,
Sanquhar
1922 Broatch, George, Dryfesdalegate, Lock-
erbie
1922 Broatch, George, Thwaite, Ruthwell
1922 Broatch, James, Sommerfield, Annan
1922 Broatch, Robert, Thwaite, Ruthwell
1922 Broatch, William, Horselose, Annan
1922 Broatch, William J., Cocklieke, Annan
1922 Brodie, David, Ravenscraig, Dumfries
1922 Brown, John, Templeland, Thornhill
1922 Brown, Joseph, Roberthill, Lockerbie
1922 Brown, Robert, Croftjane, Thornhill
1922 Brown, Thomas Dunlop, Annandale
Avenue, Lockerbie
1922 Brown, William, Comlongan Nursery,
Ruthwell

- 1922 Brown, William, Drum, Thornhill
1922 Brunton, George D., Craiglearan,
Moniaive
1921 Buchanan-Jardine, John William, Com-
longan Castle, Ruthwell
1922 Burgess, Herbert, Slobahill, Lockerbie
1922 Burns, Archibald F., 17 High Street,
Lockerbie
1922 Byrne, Colonel E. I. I., of Elsiefields,
Lochnaber
1922 Calder, Robert, Barnkine-of-Craigs,
Dumfries
1922 Carmichael, John, Lochbank, Loch-
maben
1922 Cartner, John, Clerkhill, Langholm
1922 Cassels, James H., of Auchestroan,
Moniaive
1922 Chalmers, James S., Charlesfield, Annan
1922 Chalmers, John, Outer Woodhead, Can-
onbie
1922 Clark, John, Waterhead of Dryfe,
Boreland, Lockerbie
1922 Clenaghan, James, Lochvale, Dumfries
1922 Cochrane, Matthew, Cairnmill, Penpont
1922 Common, Thomas, Bridgemuir, Locker-
bie
1922 Copland, Samuel, Castlebank, Dumfries
1922 Cormack, David, 49 Victoria Square,
Lockerbie
1922 Corrie, Thomas, jun., Blue Bell Hotel,
Lockerbie
1922 Coulthard, William, Greenfield, Ruth-
well
1922 Crawford, Peter W., Dryfeholm, Locker-
bie
1922 Crichton, David, Limekilns, Annan
1922 Crichton, D. W., Limekilns, Annan
1922 Crozier, Peter, Sorbie, Ewes, Langholm
1922 Dalglish, Robert, jun., Ulzie, San-
quhar
1922 Davidson, John, North Bowerhouses,
Ruthwell
1922 Dinwiddie, Robert, Overton, Moffat
Road, Dumfries
1922 Dobie, A., Hitchell, Cummertrees,
Annan
1922 Douglas, Robert, Rigghill, Closeburn,
Dumfries

- 1922 Dunlop, D., Annfield, Dumfries
 1922 Elliot, Andrew, Mosspebble, Langholm
 1922 Elliot, Christopher, Bogrie, Canonbie
 1922 Elliot, David, Ladyhousesteads, Canonbie
 1922 Elliot, Thomas, Mid Knock, Westerkirk, Langholm
 1922 Erskine, Robert J., Courthill, Auldgrith, Dumfries
 1922 French, Thomas, Glenmanna, Penpont, Dumfries
 1921 Galloway, William, Commercial Bank of Scotland, Dumfries
 1922 Gardner, James, Bystoch, Ruthwell
 1922 Gaskell, William Roscoe, Kirklands, Kirkconnel, Dumfries
 1922 Gaskell, William Ross, of Auchinbrack, Tynron, Thornhill
 1922 Gass, Mathew R., Mouswald Townhead, Ruthwell
 1921 Gracie, William, Billholm, Langholm
 1922 Graham, David, Carlesgill, Langholm
 1922 Graham, James, of West Mains, Collin, Dumfries
 1922 Grierson, Sir Robert, Bart., of Lag, Breconrae, Dumfries
 1922 Halliday, James, Parks Farm, Beattock
 1921 Hannan, Colonel James Menteith, East Tinwald, Dumfries
 1922 Hastie, David II., Victoria Terrace, Dumfries
 1922 Hastings, Joseph A. K., Livingstone Place, Lockerbie
 1922 Henderson, Alexander, Gotterbie, Lockerbie
 1922 Henderson, James, Slatehouse, Moniaive, Dumfries
 1922 Henderson, William, Stewarton, Moniaive, Dumfries
 1922 Hiddleston, William A., Nithbank, Dumfries
 1922 Hill, John, South Bowerhouses, Ruthwell
 1922 Hill, Joseph J., Battlehill, Annan
 1922 Hogg, Thomas, Cleuchfoot, Langholm
 1922 Hope-Johnstone, Evelyn Wentworth, of Annandale, Rae hills, Lockerbie
 1922 Howat, Andrew, Netherwood Farm, Dumfries
 1922 Howat, Jasper, Nether Gribton, Holywood
 1922 Howatson, Thomas, Calf Park, Ruthwell
 1922 Hunter, Adam, High Street, Lockerbie
 1922 Hunter, Robert, Auctioneer, Thornhill
 1922 Hyslop, C. C., Kirkhill, Johnstone-bridge, Lockerbie
 1922 Hyslop, Thomas, Lynholm, Langholm
 1922 Irving, George, Glenzierhead, Canonbie
 1922 Irving, John, Coatsdon, Moniaive
 1922 Irving, John W., Muirhousehead, Lockerbie
 1922 Irving, William, jun., Boreland, Dunscore, Dumfries
 1922 Jackson, James, Beechwood, Lockerbie
 1922 Jamieson, John, Roundbush, Annan
 1922 Jardine, William, Annanbank Farm, Johnstonebridge, Lockerbie
 1921 Johnston, John, Mellantae, Lockerbie
 1922 Johnstone, Andrew, Whitesands, Dumfries
 1922 Johnstone, James, Beckton Hall, Half-Morton, Canonbie
 1922 Johnstone, Thomas, Tomshielburn, Canonbie
 1922 Johnstone, Walter, c/o J. Charlton & Sons, Dumfries
 1922 Keenlyside, Tom Hall, Preston Hall, Annan
 1922 Ker, John Thomson, Spittalriddinghill, Annan
 1922 Kerr, A., Fernyleuch, Lochmaben
 1922 Kerr, John, Shearington, Carlaverock
 1922 Kirk, James, Kirkpatrick, Auldgrith
 1922 Kirkpatrick, Joseph, Thornhill, Dumfries
 1922 Laidlaw, Andrew Glendinning, 84 High Street, Lockerbie
 1922 Laidlaw, James, Glengar, Peupont, Dumfries
 1922 Lammie, Thomas, Chapel Farm, Moffat
 1922 Latimer, R. R., 22 Carlyle Place, Annan
 1922 Lindsay, John, Carterton, Lockerbie
 1922 Lindsay, William, Cogries, Beattock
 1921 Little, David, Corriehalia, Lockerbie
 1922 Little, James, "Colwyn," Cassalands, Dumfries
 1922 Little, James, Shillingland, Moniaive
 1922 Little, John, Beckhall, Canonbie
 1922 Little, Walter, Stanhope, Ruthwell
 1922 Lockhead, Thomas, Beyond the Burn, Ruthwell
 1922 M'Alister, John W., Rathen, Maxwelltown
 1922 M'Call, James B., yr. of Caitloch, Moniaive
 1922 M'Call, Robert, 7 Assembly Street, Dumfries
 1922 M'Cormack, Robert, Woodlandbanks, Hightae, Lockerbie
 1922 M'Crone, Robert, Poundland, Dunscore
 1922 MacDonald, D. J., Annandale Arms, Moffat
 1922 Mackie, Hugh J., Gretna House, Gretna Green
 1922 Mackie, James, Dornock Mains, Annan
 1922 Mackie, James, Relief, Ecclefechan
 1922 Mackie, James C., Dornock Mains, Annan
 1922 Mackie, John, Broomhouses, Lockerbie
 1922 Mackie, John, Dalfilbble, Dumfries
 1922 M'Murdo, Captain James Norman, M'Murdoaton, Dumfries
 1922 M'Murdo, John J., of M'Murdoaton, Dumfries
 1922 M'Murtrie, William, Gillenbie, Lockerbie
 1922 M'Vittie, Andrew, Glendivan, Langholm
 1922 Martin, William James, Merkland, Penpont, Dumfries
 1922 Martindale, Edward, Townfoot, Ruthwell
 1922 Maxwell, Alexander, Shaw of Dryfe, Lockerbie
 1922 Maxwell, James H., Hayfield, Thornhill
 1922 Maxwell, M'Kill, Coshogle, Thornhill
 1922 Melrose, John William, 50 Cardoness Street, Dumfries
 1922 Milligan, William, Burnmouth, Thornhill
 1922 Moffat, George L., Livingstone Place, Lockerbie
 1921 Montgomery, William, Overton, New Abbey, Dumfries
 1922 Morgan, Robert L., Rockhall, Dumfries
 1922 Morrison, Thomas, Eldin, Moffat Road, Dumfries
 1922 Murdoch, John, Auchengassel, Thornhill
 1922 Nelson, George, Eaglesfield, Lockerbie
 1922 Nichol, Thomas, Hugharrig, Canonbie
 1922 Nicholson, Christopher, Nethertown, Cummertrees, Annan
 1922 Nicholson, James, Nethertown, Cummertrees, Annan
 1922 Osborne, James, Ryemuir, Torthorwald, Lochmaben
 1922 Paterson, John, Mount Sydney, Craigs Road, Dumfries
 1922 Paterson, Thomas Craig, Woodend Farm, Beattock

1922 Paton, John, Chanlockfoot, Penpont,
by Thornhill
1922 Pattie, Thomas, Muirfield, Lochmaben
1922 Pender, James, 44 Townhead, Lockerbie
1922 Phillips, Archibald, Barnmuir, Close-
burn, Dumfries
1922 Preston, Alexander, Marchfield Farm,
Dumfries
1922 Renwick, John B., Castle Hill, Moniaive
1922 Richardson, Emerson, Kirkbeck, Ruth-
well
1922 Richardson, George, Balgray Home
Farm, Lockerbie
1922 Richardson, Robert, Daltonhook, Lock-
erbie
1922 Roddan, John, West Cluden, Newbridge,
Dumfries
1922 Rome, John, Fauldie, Canonbie
1922 Russell, William, Longmyre, Thornhill
1922 Scott, George, Lagg, Dunscore
1922 Scott, George B., Newbie Mains, Annan
1922 Scott, John, Annandale House, Lock-
erbie
1922 Scott, John C., Aiket, Ruthwell
1922 Scott, Joseph F., Dryfe Brig, Rae
Street, Dumfries
1922 Sharp, Alexander M., Mouswald Banks,
Dumfries
1922 Shaw, James, Glengower, Holywood,
Dumfries
1922 Short, William, Craighaugh, Langholm
1922 Simpson, John, Emerald Park, Annan
Road, Dumfries
1922 Sloan, Thomas, Fountainbleau, Dumfries
1922 Sperlmg, St John V. H., Rammerscales,
Hightae, Lockerbie
1922 Spragge, Lieut.-Colonel Basil E., D.S.O.,
of Denbie, Lockerbie
1921 Stevenson, Andrew C., Hillhead, Canon-
bie, Dumfries
1922 Stevenson, James, Muirhill, Thornhill
1922 Stewart, Hugh, Hurkledale, Cumber-
trees, Annan
1922 Stewart, Robert F., Halldykes, Lock-
erbie
1922 Stewart, T. J., Broom, Annan
1922 Strawhorn, Ritchie, Nether Garrel,
Courance, Dumfries
1922 Struthers, James, Clarencefield, Ruth-
well
1922 Struthers, Robert, Arkland, Penpont,
Dumfries
1922 Thomson, Matt. J., Rose Cottage,
Annan
1922 Thomson, Robert, March Hill, Dumfries
1922 Thomson, Thomas, March Hill, Dum-
fries
1922 Thomson, Thomas, jun., March Hill,
Dumfries
1922 Todd, William, Knockaughley, Moniaive
1922 Turnbull, Matthew C., Hartfield, John-
stone, Lockerbie
1922 Walker, Captain George G., of Crawford-
ton, by Thornhill
1922 Walker, James, Kirkton, Lockerbie
1922 Ward, James, of Woodhead, Moffat
1922 Wardrop, George, Nutholmhill, Lock-
erbie
1922 Warwick, Archibald, Gillbrae, Ruth-
well
1922 Warwick, James, Denbieyett, Ruthwell
1922 Watson, James, Stonehouse, Greta
1922 Watson, Robert, Upper Portrack, Auld-
girth
1922 Weir, Adam, Ironhirst, Ruthwell
1922 White, Robert, Smallholm Burn, High-
tae, Lockerbie
1922 Will, William J., Acrehead, Dumfries
1922 Williams, H., Cowhill Estate Office,
Holywood

1922 Wilson, Alexander Milroy, Broom-
hillbank, Lockerbie
1922 Wilson, David, Auchenhessnane, Pen-
pont, Dumfries
1922 Wilson, David, Newmains, Keir, by
Thornhill, Dumfries
1922 Woodburn, John, Castlemilktown,
Lockerbie
1922 Wyllie, Robert Alfred, Elmbank, Dum-
fries
1922 Young, Andrew, V.S., 42 George Street,
Dumfries
1922 Young, James F., Mouswald School-
house, Ruthwell, R.S.O.
1922 Young, John M'D., Robgill Mains,
Kirklebridge, Dumfries

KIRKCUDBRIGHT

1922 Allan, Robert, Kilmichael, Castle-
Douglas
1922 Allison, James, Garmartin, Dalbeattie
1922 Anderson, James, Campbelltown, Twyn-
holm, R.S.O.
1922 Anderson, Robert, Mill Bank, Haugh-
of-Urr, Dalbeattie
1922 Anderson, William, Whiteside, Kirk-
gunzeon
1922 Armstrong, G. W., Langbarns, Kirk-
cudbright
1922 Austin, Lieutenant Alex. Douglas, Dun-
dreinan House, Kirkcudbright
1922 Austin, Lieutenant Robert, Boreland of
Girthon, Gatehouse-of-Fleet
1922 Austin, Captain William, M.C., Bore-
land of Girthon, Gatehouse-of-Fleet
1922 Baird, Hugh G., Kirkchrist, Kirkcud-
bright
1922 Baird, J. Gilmour, Kirkchrist, Kirkcud-
bright
1922 Barber, James C., Carleton, Borgue
1922 Barbour, Robert, Rockville, Castle-
Douglas
1922 Barbour, Robert, Tallowquhairn, Kirk-
bean, Dumfries
1922 Barbour, William Sinclair, Strathdee,
Kirkcudbright
1922 Barr, John, Valleyfield, Ringford
1922 Barrowman, Andrew, Corrahill, Castle-
Douglas
1922 Barrowman, John D., Corrahill, Castle-
Douglas
1922 Bell, John, Rascarrow, Castle-Douglas
1922 Bickerstaff, Thomas, Bomie, Glen,
Kirkcudbright
1922 Bicket, James, Gerranton, Castle-
Douglas
1922 Biggar, J. M. R., Newton House, Dal-
beattie
1922 Biggar, Thomas, Hazeldene, Castle-
Douglas
1922 Biggar, W. T., Montrose, Dalbeattie
1922 Black, Robert (of Rogerson & Black),
Kirkcudbright
1922 Blacklock, Samuel, Little Sypland,
Kirkcudbright
1922 Brown, Lieut.-Colonel Adam, County
Buildings, Kirkcudbright
1922 Brown, J. Douglas, Knockbren, Borgue
1922 Brown, Mrs. Knockbren, Kirkcudbright
1922 Brown, Quintin, Argrennan, Castle-
Douglas
1922 Brown, William, Chapelton, Dun-
dreinan, Castle-Douglas
1921 Bristowe, Sydney C., of Craig, Bal-
maclellan, Kirkcudbrightshire
1922 Callender, Alex., Largs, Twynholm
1922 Campbell, John, Kirkbride, Castle-
Douglas

- 1922 Campbell, John, Laurel Bank, Castle-Douglas
 1922 Campbell, William, Auchlane, Castle-Douglas
 1922 Campbell, William Samuel, High Borgue, Twynholm, R.S.O.
 1922 Carson, James, Pearmount, Dumfries
 1922 Carson, James, Walton Park, Dalbeattie
 1922 Christal, Thomas L., Ernmenzie, Castle-Douglas
 1922 Clark, G., Newmains, Kirkbean, Dumfries
 1922 Clement, A. M., Howell, Kirkcudbright
 1922 Clement, T. G., Howell, Kirkcudbright
 1922 Cochrane, Alex., Little Richorn, Dalbeattie
 1922 Cochrane, W. R., Little Richorn, Dalbeattie
 1922 Corrie, Adam, Auchengool, Rerrick, Castle-Douglas
 1922 Corrie, James, Kirkconnel, Ringford
 1922 Corrie, R., West Ardwall, New Abbey, Dumfries
 1922 Corrie, William, Clydesdale Bank, New Galloway
 1922 Cowan, Henry, South Corbally, New Abbey Road, Kirkbean, Dumfries
 1921 Cowan, William, Ingleston, New Abbey, Dumfries
 1922 Crawford, Hugh, 78 Cotton Street, Castle-Douglas
 1922 Crosbie, William, Billies, Castle-Douglas
 1922 Cross, Thomas, St Mary's Isle Estate Office, Kirkcudbright
 1922 Cruickshank, John, Castlecreavie, Kirkcudbright
 1922 Cruickshank, John, Kempleton, Twynholm
 1922 Cruickshank, William, Redfield, Twynholm, R.S.O.
 1922 Dobie, Harold, 112 Queen Street, Castle-Douglas
 1922 Donald, Alexander, Chief Constable, Kirkcudbright
 1922 Douglas, Captain J. B., Barstibly, Castle-Douglas
 1922 Downey, W. J., Carisbrooke, New Abbey Road, Maxwelltown, Dumfries
 1922 Drummond, James, Mersehead, Southwick, Dumfries
 1921 Dudgeon, Mrs Grizel, Cargen Holm, Dumfries
 1922 Duncan, David, Balmas House, Kirkcudbright
 1922 Duncan, William, Muncraig, Borgue
 1921 Duncan, Peter, Muncraig, Borgue
 1922 Edgar, Thomas, Newfield, Dairy, Kirkcudbright
 1922 Ewart, Samuel, Meikle Firthead, Dalbeattie
 1922 Farish, George, Culloch, Dalbeattie
 1922 Farries, Francis, Risk, Castle-Douglas
 1922 Farries, James, Boreland, Balmaghie, Castle-Douglas
 1922 Ferguson, Hugh, Bridgestone, Castle-Douglas
 1922 Finlay, John, The Ross, Kirkcudbright
 1921 Fraser, John, Barmark, Corsock, Dalbeattie
 1922 Gibson, Alexander, Speddooch Hill, Shawhead, Dumfries
 1922 Gibson, John, National Bank of Scotland, Kirkcudbright
 1922 Gifford, Patrick, Solicitor, Castle-Douglas
 1922 Gilchrist, James, Ewanston, Balmacellian, Kirkcudbright
 1922 Gillespie, R. C., W.S., Castle-Douglas
 1922 Gordon, William Edward, Dunjop, Castle-Douglas
 1922 Grierson, James, Orroland, Castle-Douglas
 1922 Grierson, James, Stockerton, Kirkcudbright
 1922 Grierson, Joseph J., Auchenlarie, Gatehouse-of-Fleet
 1922 Haining, Sam., 8 Castle Street, Kirkcudbright
 1922 Halliday, John, Meikle Kirkland, Crocketford, Dumfries
 1922 Hannah, R. B. S., Angel Hotel, Gatehouse-of-Fleet
 1922 Hannay, Lieut. - Colonel Frederick Rainsford, C.M.G., D.S.O., Kirkdale, Gatehouse-of-Fleet
 1922 Hannay, Robert, Tariff, Ringford
 1922 Hayman, John, jun., Glentarf, Ringford, Castle-Douglas
 1922 Hendry, John, Chapel, Ringford, Castle-Douglas
 1922 Hodge, David, Fintloch, New Galloway
 1922 Hogg, James, Enrick, Gatehouse - of - Fleet
 1922 Holmes, Emra, Belmont, Kirkcudbright
 1922 Howat, Andrew, Chapelerne, Dalbeattie
 1922 Hunter, John, Bogue, Dairy
 1922 Hutton, Samuel S., Buittle Mains, Dalbeattie
 1922 Hyslop, Daniel, Holehouse, Dalbeattie
 1922 Hyslop, George, Cowar, Dalbeattie
 1922 Jardine, George, Hallcroft, Dalbeattie
 1922 Johnston, Hugh W., Ryedale House, Maxwelltown
 1922 Johnston, William, jun., College Mains, Maxwelltown
 1922 Johnstone, Allan, Glaisters, Corsock, Dalbeattie
 1922 Johnstone, Robert, Blackloch, Gatehouse-of-Fleet
 1922 Johnstone, Robert, Linkins, Castle-Douglas
 1922 Johnstone, Robert, The Park, Maxwelltown
 1922 Johnstone, Walter, Birkhill, Crossmichael, Castle-Douglas
 1922 Kelly, Judge William J., Ferguslea, Maxwelltown
 1922 Kerr, Peter, Shiel, New Galloway
 1922 Kerr, William, Campdouglass, Castle-Douglas
 1922 Kincaid, John, Corseyard, Borgue
 1922 Kirkland, Robert, Cowcorse, Prestonmill, Dumfries
 1922 Laing, Hugh, of Barscobe, Balmacellian (Scaleby Castle, Carlisle)
 1922 Latta, R. Allan, Craigadam, Dalbeattie
 1922 Laurie, Andrew, Union Bank, Gatehouse-of-Fleet
 1922 Lee, Alexander, Cannea Home Farm, Kirkcudbright
 1922 Lindsay, John, Boreland, Twynholm, R.S.O., Kirkcudbright
 1922 Little, Robert, Breconiehill, Dalbeattie
 1922 Logan, James, Criffel House, Kirkbean, Dumfries
 1922 Lorimer, R. Gordon, Meiklewood, Ringford
 1922 Lorimer, James A., Meiklewood, Ringford
 1922 M'Caas, William, Newfarm, Southwick, by Dumfries
 1922 M'Call, Wellwood M., Great Cross, St Mary's Isle, Kirkcudbright
 1922 M'Connell, William, Solicitor, Gatehouse-of-Fleet
 1922 M'Coskry, William, Netherthird, Castle-Douglas

- 1922 M'Cutcheon, Alexander, Goatend, Gatehouse-of-Fleet
 1922 M'Cutcheon, Alexander, Lochlyoch, Gatehouse-of-Fleet
 1922 M'Dowall, Andrew, Abbey Burnfoot, Dundrennan, Castle-Douglas
 1921 MacGill, Cameron, Barcheskie, Dundrennan, Castle-Douglas
 1922 M'Guffie, James, Dunjarg House, Castle-Douglas
 1922 Mackie, George, Meikle Dalbeattie, Dalbeattie
 1922 M'Lellan, Major Thomas R., Marks, Kirkcudbright
 1922 M'Murray, James, Royal Garage, Kirkcudbright
 1922 M'Taggart, John, Herriesdale, Dalbeattie
 1922 M'Turk, Oliphant, Barlae, Dalry
 1922 M'Turk, T., Stranlasket, New Galloway
 1922 M'William, Alexander, Canabony, Kirkbean, Dumfries
 1922 M'William, David, Canabony, Kirkbean, Dumfries
 1921 Marshall, George A., 2 St Cuthbert's Place, Kirkcudbright
 1922 Miller, Matthew, Dowell, Troqueer, Dumfries
 1922 Mitchell, David, Waterside, Dalry, Galloway
 1922 Moffat, Robert D., Under-the-Brae, Lochrutton, Dumfries
 1922 Moffat, William, Mayfield, Castle-Douglas
 1922 Montgomery, James, Implement Works, Castle-Douglas
 1922 Montgomery, Miss M. P., Banks, Kirkcudbright
 1922 Montgomery, Miss, Netherhall, Castle-Douglas
 1922 Murdoch, William, Clydesdale Bank, Castle-Douglas
 1922 Murphy, Donald, Doon-of-Urr, Dalbeattie
 1922 Neill, John S., Grennan, Dalry, Galloway
 1922 Nicholson, George H., M.R.C.V.S., St Mary's Street, Kirkcudbright
 1922 Nicholson, Stewart, Bombie, Kirkcudbright
 1922 O'Brien, David, Laurieknowe House, Maxwelltown
 1922 Owens, George W., Barncrosh, Castle-Douglas
 1922 Parker, John R., Auchenhay, Twynholm
 1922 Payne, John R., Douglas Arms Garage, Castle-Douglas
 1922 Penman, Maxwell, Motor Engineer, Castle-Douglas
 1922 Phillips, Captain R. C., M.C., Carse, Kirkcudbright
 1922 Picken, James, jun., Torrs, Kirkcudbright
 1922 Picken, William Y., Dromore, Kirkcudbright
 1922 Rae, David, British Linen Bank, Castle-Douglas
 1922 Rae, John, Barclay, Kirkcudbright
 1922 Ramsay, R. Neill, Solicitor, Castle-Douglas
 1922 Reid, William, Broadlea, Dalbeattie
 1922 Rennie, Thomas, Diamonds Laggan, Parton
 1922 Rigg, James, Haugh of Urr, Dalbeattie
 1922 Rigg, William, Balgreddan, Kirkcudbright
 1922 Robb, George, Barscobe, Balmacellian
 1922 Robertson, Andrew, Glen, Gatehouse-of-Fleet
 1922 Robson, Thomas, Blackcraig, Borgue
 1922 Rodan, John, Auchnabony, Dundrennan, Castle-Douglas
 1922 Rogerson, Christopher (of Rogerson & Black), Kirkcudbright
 1922 Saunders, J. R., Solicitor, Castle-Douglas
 1921 Scott, John, Drumhumphry, by Dalbeattie
 1922 Shedden, John, Hallhills, Lockerbie
 1922 Shedden, William, Balgerran, Cross-michael
 1922 Sloan, Thomas Craig, 26 Cotton Street, Castle-Douglas
 1922 Smith, James, Mark, Twynholm, R.S.O.
 1922 Smith, James, Mill of Plunton, Borgue
 1922 Smith, Captain James Parker, Cumstoun Mains, Twynholm
 1922 Smith, John, Meikle Knox, Castle-Douglas
 1922 Smith, John, Torrs of Kelton, Castle-Douglas
 1922 Smith, J. D., Linnwood, Dalbeattie
 1922 Smith, Matthew, Leathes, Castle-Douglas
 1922 Southcomb, William H. G., Estate Office, Knockbrex, Kirkcudbright
 1922 Sproat, John Faed, Boreland of Anwoth, Gatehouse-of-Fleet
 1922 Sproat, J. B., Lennox Plunton, Borgue
 1922 Sproat, Thomas A., Borgue House, Borgue
 1922 Sproat, William, Hazelfield, Auchencairn, Castle-Douglas
 1922 Steel, Christopher, Auchentranno, Lochfoot, Dumfries
 1922 Steel, David, Auchentranno, Lochfoot, Dumfries
 1922 Streatfeild, Major H. S., Barlay, Balmacellian
 1922 Streatfeild, Captain Sydney Richard, Barlay, Balmacellian
 1922 Stroy, Hugh Ross, Crockettford House, Crockettford, Dumfries
 1922 Tait, James, Craigmullen, Castle-Douglas
 1922 Thomson, Thomas, Greenhall, Bridge of Dee, Castle-Douglas
 1922 Wallace, Robert, Strathmore, Castle-Douglas
 1922 Watson, Hugh, Gientoo, Castle-Douglas
 1922 Watson, Robert, Halferne, Castle-Douglas
 1922 Watson, William, Viewfield, New Galloway
 1921 Weir, James, Brickhouse, New Abbey Road, Dumfries
 1922 Welsh, Jesse Hartley, Langlands, Twynholm
 1922 Welsh, William, Starryheugh, Dumfries
 1922 Williamson, James (John Charlton & Sons), Grain Merchant, Kirkcudbright
 1922 Wilson, Alexander, Briardale, Dalbeattie
 1922 Young, James B. H., Congeith, Kirkcunzeon

WIGTOWN

- 1922 Alexander, John, Lagganmore, Portpatrick
 1922 Bell, James, Low Three Mark, Stoneykirk
 1922 Black, Peter M'Candlish, Portyrock, Whithorn
 1922 Brown, Ebenezer Kennedy, Bridgehouse, Sorbie
 1922 Chalmers, John B., Barsolus, Stranraer
 1922 Cochran, Fred. J., Craigcaffie, Stranraer
 1922 Crawford, James, Broughton Skeog, Sorbie

- 1922 Douglas, William, Pinminnoch, Portpatrick
 1922 Edgar, Archibald, M.R.C.V.S., Whithorn
 1922 Ferguson, William Todd, Mark, Castle-Kennedy
 1922 Fisher, John B., Barnsallie, Glenluce
 1922 Gibson, John, Secretary, Farmers' Union, Stranraer
 1922 Gibson, William, Beoch, Cairnryan
 1922 Gilmour, James A., South Cairn, Ervie, Stranraer
 1922 Goldie, William, Boreland, Glenluce
 1922 Graham, James M., Caldons Park, Stoneykirk
 1922 Grierson, Robert, of Clendrie, Kirkcolm
 1922 Jamieson, Thomas, High Curghie, Drummore
 1922 Kerr, Robert, Machermore Mains, Newton-Stewart
 1922 Love, James M'Murray, Kilumpha, Port Logan
 1922 M'Caig, Robert, Kilhilt, Stranraer
 1922 MacLellan, Duncan, Balker Home Farm, Castle-Kennedy
 1922 M'Camon, Alexander W., of Kirranrae, Kirkcolm
 1922 M'Clelland, W. V., Redbrae, Wigtown
 1922 M'Clymont, Alexander, Creebank, Bargrennan, Newton-Stewart
 1922 M'Creath, Robert, Arbrack, Whithorn
 1922 M'Culloch, William, Barscarron, Sandhead
 1922 M'Harg, John, Barbeth, Leawalt
 1922 M'Harrie, James, of Duchra, Lochans, Stranraer
 1922 M'Harrie, William, Drummockloch, Cairnryan
 1922 M'Illwraith, George A., Stannock, Whithorn
 1922 M'Intyre, Ian, Logan Mains, Ardwell
 1922 M'Master, Hugh A., Milnain, Stoneykirk, Stranraer
 1922 M'Murray, Andrew, Aird, Stranraer
 1922 M'Neil, John, Merslaugh, Leawalt
 1922 M'William, Alexander, Dhuloch, Kirkcolm
 1922 Morton, George, Auldbreck, Whithorn
 1922 Muir, Alexander A., Rispaig, Whithorn
 1922 Muir, Robert Barclay, Corwar Outon, Whithorn
 1922 Neil, Alexander, Kilbreon, Stranraer
 1922 Owen, Alexander M., Culnoag, Sorbie
 1922 Rae, John A., Gallows Outen, Whithorn
 1922 Rankin, John S., Cairnbrock, Leawalt
 1922 Reid, Charles, Mahaar, Castle-Kennedy
 1922 Ross, Robert, Cairnside, Ervie, Wigtown
 1922 Rutherford, Joseph P., Dunccliffe, Stranraer
 1922 Smith, John, Borrowmoss, Wigtown
 1922 Smith, Thomas, Seedsman, Blackpark, Stranraer
 1922 Sproat, John N., Baldoon, Wigtown
 1922 Stair, Rt Hon. the Countess of, Lochinch, Castle-Kennedy Station
 1921 Stewart, Edward Orde M'Taggart, Ardwell, Wigtownshire
 1922 Wallace, James, jun., Knockneen, Ervie, Kirkcolm
 1922 Wilson, Robert, Stair Drive, Stranraer
 1922 Wither, Peter H., Knocktinn, Ervie, Kirkcolm
 1922 Wyllie, Hugh Alexander, Bridge Street, Stranraer

7.—INVERNESS DIVISION

CAITHNESS

- 1921 Bain, John, Murza Mains, Bower, Caithness
 1922 Gordon, Stuart Hill, Thurdistoft, Castletown, Caithness
 1922 Innes, Joseph A., Borlum, Reay, Caithness

MORAY

- 1922 Bruce, William Dalgarno, Bogs of Bervie, Forres
 1922 Douglas, George, Calcots, Elgin
 1922 Geddes, Alexander, Essie, Garmouth
 1921 M'William, H. A., Nether Bogside, Elgin

INVERNESS

- 1921 Campbell, John, Livers Farm, Broadford, Isle of Skye
 1922 Cooper, Lieut.-Colonel H. L., Struy Lodge, Beaulie
 1921 Dunbar, Col., Pitoullish, Aviemore
 1922 Fraser, Andrew, Teanlonaig, Beaulie
 1921 MacBean, Peter, Milton of Balnagown, Ardersier, Fort George
 1921 Miller, James, M.A., B.Sc., Board of Agriculture for Scotland, 59 Academy Street, Inverness
 1921 Robertson, Norman, North Harris Estate Office, Tarbert, Harris

- 1921 Shaw, Alistair, Farraline Mains, Erroglie, Inverness
 1921 Shaw, William, Easter Aberchaldie, Gorthlick, Inverness
 1921 Smith, John M., Dores, Inverness-shire
 1921 Urquhart, William, Rhuair, Lochmaddy

NAIRN

- 1922 Munro, Donald, Winewell, Little Mill, Nairn
 1922 Taylor, John, Burnside of Lethen, Auldearn

ORKNEY

- 1921 Craigie, John, Glebe, Rousay
 1922 Mackay, John, Stairwady, Stromness
 1922 Tomison, John, Halcro, St Margaret's Hope, Orkney

SHETLAND

- 1921 Armstrong, Miss Elizabeth M.S., N.D.D., Agricultural College Office, Lerwick

ROSS AND CROMARTY

- 1921 Brown, Mrs Flora, Applecross, by Kyle, Ross-shire
 1921 Cameron, David, Culbo Mains, Cullcudden, Conon Bridge

- 1921 Grant, Donald, Factor, Fairburn, Muir of Ord
 1921 M'Donald, Thomas Gordon, Craiglands, Fortrose
 1921 M'Farlane, James, Novar Home Farm, Evanton
 1921 Nicol, James, Wester Culbo, Culbokie, Conon Bridge
 1922 Middleton, G. G., Davidston, Crounarty

- 1921 Noble, John, Taeneig, Munlochay
 1921 Ross, John, Muirtown Mains, Fairburn, Muir of Ord.

SUTHERLAND

- 1922 Macaulay, Alfred C., Bank House, Golspie

8.—BORDER DIVISION

BERWICK

- 1921 Elliot, Frank J., Crunklaw, Duns
 1922 Finlay, Major Ian Archibald, Temple Hall, Coldingham
 1922 Jacobsen, Gerald J., Reston Mains, Reston
 1921 Sanderson, Charles William, Birnieknowes, Cockburnspath

PEEBLES

- 1922 Meikle, Robert, "Eshiels," Peebles

ROXBURGH

- 1922 Aitken, Andrew, Springwells, Kelso
 1922 Balfour, Captain C. J., Newton Don, Kelso
 1921 DALKEITH, EARL OF, Eildon Hall, St Boswells
 1922 Hogarth, Mrs M. W., Galalaw, Kelso
 1921 Marshall, Anthony Charles, Cherrytrees, Kelso
 1921 Scott, Matthew, Shankend, Hawick
 1922 Scott, Thomas, Milsington, Hawick
 1922 Scott, Hon. Walter T. H., Harden, Hawick

ENGLAND AND WALES

- 1922 Anderson, A. W., Lairbeck, Keswick
 1922 Bruce, Miss I. M., Eshott Hall, Felton, Northumberland
 1921 Berry, G., 25 Hope Street, Crewe
 1921 Brotherhood, Stanley (Peter Brotherhood, Ltd.), Peterborough
 1922 Chew, Robert Selby, Chopwell Wood, Rowlands Gill
 1922 Chichester, Major Charles Hamlyn, Hall, Barnstaple
 1922 Cook, Walter H., Beehive Wharf, Brentford, Middlesex
 1921 Davis, L. (Davis & Co.), 36 George Street, Oxford
 1921 Doig, John A. (The Sozon Oil Co., Ltd.), 2 Mount Street, Manchester
 1922 Duffus, John C., Penniwells, Elstree, Herts
 1922 Errington, Roger, Victoria Mills, Sunderland
 1922 Garner, Henry (H. Garner, Limited), Moseley, Birmingham
 1922 Harrison, Edwin John (Barker & England, Limited), Sheffield (Owston Ferry, Doncaster)
 1921 Hodgson, James, Riddings Mount, Longtown, Cumberland
 1922 M'Laren, H. J. (J. & H. M'Laren, Limited), Midland Engine Works, Leeds
 1922 Montgomery, Kenneth Barbour (of Simmonds, Hunt, & Montgomery), 8 Fenwick Street, Liverpool
 1921 Neale, Arthur, Managing Director, International Harvester Co. of Great

- Britain, Ltd., 80 Finsbury Pavement, London, E.C. 2
 1922 Paton, George William, Managing Director, Bryant & May, Ltd., Fairfield Works, Bow, London, E. 3
 1922 Pearson, Mrs Andrew, House of Barns, Chobham, Surrey
 1922 Ripley, Albert, 2 St Nicholas Buildings, Newcastle-on-Tyne
 1922 Robb, R. Lindsay, C.D.A., N.D.A., Principal, Newton Rigg Farm School, Penrith
 1922 Robinson, H. B., Assistant European Manager (Messrs Massey-Harris, Limited), 54 Bunhill Row, London, E.C. 1
 1922 Sanderson, F. H., Eshott Home Farm, Felton, Northumberland
 1922 Sanderson, Mrs F. H., Eshott Home Farm, Felton, Northumberland
 1922 Steel, John, M.R.C.V.S., Southley, Wigton, Cumberland
 1922 Stockley, Richard M., Coombe Park, Whitchurch, Oxon.
 1922 Summerfield, Thomas A., Buckton, Belford, Northumberland
 1922 Summerfield, Mrs, Buckton, Belford, Northumberland
 1921 Talby, Norman (Stonehouse Works Company), Houghton Street, West Bromwich
 1922 Waide, Walter (Waide & Son, Limited), Crown Point Road, Leeds
 1921 Woodward, Fred J., 134 King Street, Hammersmith, London, W. 6

IRELAND

1922 Pilkington, A. J., Parkmore, Antrim

THE COLONIES

1922 Barker, Frank, C.D.A., Nyachperi
Government Farm, Nyasaland, British
Central Africa1922 Drysdale, Alexander (Box No. 1022
Johannesburg), 5 St Andrew Square,
Edinburgh

TOTAL, 1024.

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